



REPORT OF THE
**Hydro-Electric Power
Commission**
OF ONTARIO
1919
VOL. I.

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WILLS MACLACHLAN, Esq.

Wills MacLachlan




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The Chippawa-Queenston Power Development.

Photo from "Popular Science Monthly."

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Ontario Hydro-Electric Power
Commission
(Twelfth) Annual Report

OF THE

HYDRO-ELECTRIC POWER COMMISSION

OF THE

PROVINCE OF ONTARIO

FOR THE YEAR ENDED OCTOBER 31st

1919

VOLUME I

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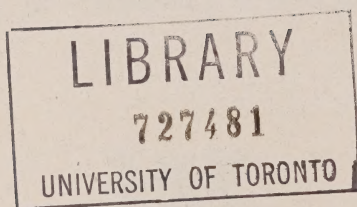


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To His Honour THE HONOURABLE LIONEL H. CLARKE,
Lieutenant-Governor of Ontario.

MAY IT PLEASE YOUR HONOUR:

The undersigned has the honour to present to your Honour Volume I of the Twelfth Annual Report of the Hydro-Electric Power Commission of Ontario for the fiscal year ending October 31st, 1919.

The Commission in submitting its Annual Report for the fiscal year does so with a measure of pride in the extremely satisfactory results of the operations of a year which has been pregnant with difficulties, due to the period of readjustment succeeding the successful conclusion of the World War in November, 1918.

The year has been fraught with many difficulties, having commenced as it did at the most critical period in the great conflict when every effort was being made by the Commission to supply the enormous demands for power in all districts for the manufacture of munitions. The signing of the Armistice came shortly after the beginning of the year, and still more obstacles were encountered during the readjustment period, when the industries throughout the Province were returning to commercial lines, during which time the loads on many systems were reduced to such an extent as to seriously decrease the revenues and consequently to embarrass the financial operations of the municipalities on these systems.

At the time of the signing of the Armistice, the Commission was supplying power in the various parts of the Province to over 400 plants working on the manufacture of munitions and war supplies. These plants were at that time using approximately 70 per cent. of the total amount of power supplied by the Commission on all systems. Immediately after the Armistice was signed most of these plants were temporarily idle until such time as their machinery, equipment and organizations could be readjusted to a peace-time basis, so that for at least eight months of the fiscal year the loads in many of the municipalities supplied had not reached normal proportions, and more especially was this true in the case of those municipalities where large blocks of power had been supplied for munition production. In some of these municipalities the loads declined 25 per cent. or more when the munition loads ceased, and it was not until the month of August that the loads reached normal proportions, from which time the recovery of commercial industries in the Province was so rapid that practically all of the available power was being used by the end of the year.

When the war broke out and there was pressing need for munitions, the Canadian manufacturers were approached by the Government with a view to ascertaining to what extent Canada could participate in supplying these demands, and while many manufacturing companies were willing to convert their entire organizations to the production of munitions, this would have been useless had not the Commission been able during the first three years of the war to supply the large quantities of power necessary to operate these plants.

In 1917 the Commission realized that its reserve of power available for the manufacture of munitions would soon be exhausted, and steps were then promptly taken to augment the supply.

This necessitated the expenditure of large sums of money on the construction of extensions to generating plants, transmission lines and systems, approximately \$7,600,000 being expended to produce 54,000 horse-power, all of which would have been available for munitions manufacture. The Commission also made arrangements whereby the Ontario Power Company of Niagara Falls was relieved of

supplying 10,000 horsepower for export, in order that this additional power might be available for munitions manufacture.

The cost of the above extensions was greatly increased by the rapid rise in the cost of labour, equipment and materials. In purchasing the equipment for these emergency plants it was found to be impossible to obtain all the necessary machinery and equipment in Canada, and no course was open but to purchase much of the apparatus in the United States in order that these plants might be constructed in the shortest possible space of time in order to be available for the supply of power for munitions production. On this account the Commission was obliged to expend large sums in duties and war taxes, amounting to over \$652,000, or an average of $37\frac{1}{2}$ per cent. of the purchase price.

During this period the labour situation was acute; not only was it almost impossible to obtain sufficient labour to carry on the work expeditiously, but the cost of labour had nearly doubled over that of pre-war days. Moreover, as is generally known, the efficiency of labour had decreased in proportion to the increase in the cost of same. The general scarcity of labour and increase in wages during the year resulted in the amount of the operating pay-rolls increasing in many cases by more than 60 per cent. over that of the previous year. The cost of materials also increased approximately 25 per cent. These factors had a most serious effect upon the operations of the Commission and were utterly beyond the power of the Commission to control, as has been the case with industries of every nature throughout the Province.

However, in spite of the enormous, uncontrollable increase in operating expenses, the revenues of the Commission have been in the main sufficient to meet all operating expenses and necessary fixed charges, practically the only exceptions being those municipalities in which large blocks of power were supplied for the manufacture of munitions, and which after the cessation of hostilities were not replaced by commercial loads until late in the year. In most of these municipalities the building up of loads to normal conditions during the coming year will place them on a paying basis, and where such is not the case a readjustment of rates may be necessary.

At the beginning of the year, the Commission fixed a schedule of rates covering the estimated cost of service to all municipalities. These rates brought in a total revenue of \$3,729,705.75, while the actual cost of service was \$3,860,700.79, which includes the total expenses for interest, cost of power, operation and maintenance, amounting to \$3,243,329.02, and all the necessary fixed charges and reserves, such as sinking fund, reserves for renewals and contingencies, amounting to \$617,371.77. After meeting all operating expenses and setting aside the reserves as above set out (in accordance with Section 23 of the Power Commission Act) the expenditures exceeded the revenue by \$130,995.04; the cost of service to all municipalities exceeding the estimates by but 3.5 per cent., a very remarkable showing in view of the phenomenal increase in the cost of labour and material. Bills and credit memoranda have been sent to the municipalities for the difference between the actual cost of service and the bills as rendered, which have already been taken up and incorporated in the books of the municipalities.

For the first time the operating reports and balance sheets of the municipalities, which appear in Volume II, will include in the cost of power, the annual adjustment from the books of this Commission, and will reflect complete operating results and all liabilities of every kind growing out of the co-operative development and transmission and the municipal distribution of electrical energy.

AUDIT

In addition to that audit carried on under the direction of the Auditor for the Province of Ontario, covering the period from the appointment of the Commission to the end of the fiscal period, October 31st, 1916, it was ordered and directed by an Order-in-Council dated May 3rd, 1916, that an independent audit and investigation of the Commission's records and books of account was to be made and for this purpose the accounting firm of Messrs. Clarkson, Gordon and Dilworth received the appointment under this Order-in-Council and shortly after its issuance commenced their duties. Messrs. Clarkson, Gordon and Dilworth completed their investigations and audit February 16th, 1918, which, as before stated, covered the activities of the Commission from the date of its appointment, 1906, up to and including the last day of the fiscal year ending October 31st, 1916, and their report was duly presented to the Treasurer of Ontario. Subsequent to this date and at the request of the Commission, the Auditors were instructed to make in like manner an audit of the accounts for the year 1917, which was done and reported upon to the Provincial Treasurer under date of August 22nd, 1918. As appointees of the Commission the audit was continued by the same firm and completed under date of April 16th, 1919, for that period ending October 31st, 1918, since which time a continuous monthly audit has been carried on, and the latest report covers the period ending October 31st, 1919, and was submitted under date of April 3rd, 1920.

NIAGARA SYSTEM

Early in the year 1917 the Commission realized that the enormous demands for power for war munition work would soon exhaust the available supply in the Niagara District, and in the summer of that year the Ontario Power Company of Niagara Falls, which is owned and operated by the Commission, approved of an expenditure of over \$2,000,000 to install a temporary pipe line and two additional generators having a total capacity of approximately 45,000 horse-power, to obtain additional power for munition manufacturing in this district. By installing a temporary wood-stave pipe line, over a year's time was saved, and water was turned into the pipe line within a year from the date the construction work was started.

On December 31st, 1918, The Toronto Power Company ceased to supply the Ontario Power Company of Niagara Falls with 11,000 horse-power that was being supplied under the Power Controller's orders, and on March 1st, 1919, a further block of 13,200 horse-power was cut off. The extension to the Ontario Power Company of Niagara Falls was sufficient to take care of these reductions in power supply and of an additional 21,000 horse-power for additional loads on the system.

At the time of the signing of the Armistice, the Commission was supplying over 80,000 horse-power to 360 plants working on the manufacture of munitions. Within eight months after the signing of the Armistice, the industries in the district had absorbed all of this available power, and so rapid was the recovery of the industries, that before the end of the year all of the available power supply was used up and it was necessary for the Commission to limit the amount of power supplied to the municipalities on this System.

Anticipating a shortage of power, the Commission is negotiating for an additional supply, and expects to obtain at least 20,000 horse-power for this System early in the coming year.

Queenston-Chippawa Development

The construction work on the Queenston-Chippawa Development, which was commenced in May, 1917, has been pushed night and day since that time. This work, however, has been carried on under great difficulties owing to the scarce, inefficient and unstable common labour supply.

Since this project was started, the vast increase in the prospective market for power has necessitated increasing the capacity of the power canal which, together with a corresponding increase in the capacity of the generating station, will greatly add to the capital cost of the development, and, based on this increased capacity and with construction under constantly increasing cost of labour and materials, the development will cost much more than the original estimate for the scheme of smaller capacity.

The estimated progress schedule for work on the development was maintained in all important particulars except in rock excavation, which, on account of the above mentioned labour difficulties, is somewhat behind our estimated schedule, but present progress shows marked improvement and is greater than schedule.

In the construction of the canal for this project it was necessary for the Commission to acquire approximately 3,100 acres of land, of which approximately 1,000 acres will be ultimately required for construction purposes.

The route of this canal traverses, in the most part, very valuable properties, cutting through orchards, vineyards, small fruit and farming districts in such a manner as to preclude the possibility of securing such sections of land only as might be necessary for construction purposes. This fact necessitated the acquirement, in some cases, of farms intact and tracts of land not necessary for the ultimate requirements of the works and which will later have to be disposed of by the Commission when the construction work has been completed.

In connection with this surplus land, the Commission was faced with the problem of how best to deal with such valuable lands. To allow them to remain idle during the period of construction—four or five years—was considered to be unjustifiable, and to rent the properties at an equitable figure in view of the circumstances, was found to be impossible. It was therefore decided to operate these lands in order to maintain them in such a condition that they could be sold advantageously when the construction work on the canal has been completed. It was not anticipated, however, that the revenue obtained from such operation would be sufficient to meet all costs in connection with the farms, but it is expected that the revenue from crops and fruit yield during the next two years will materially reduce operating deficits.

Assuming that the total sum not covered by revenue to date is all charged by way of maintenance or betterments to the property, it is found to be a reasonable percentage, viz: 5 per cent. of the total amount expended on right-of-way.

SEVERN SYSTEM

The abnormal demands for power for munition manufacture by municipalities on this System made it necessary for the Commission to extend the Big Chute Generating Station, at a cost of approximately \$215,000.00, from which extension an additional 2,000 horsepower was obtained for munition work.

After the Armistice was signed, the loads on the Severn System decreased over 25 per cent. in those municipalities supplying large blocks of power for munition manufacture, and had not reached normal conditions at the end of the year.

An increase in operation and maintenance of the System during the year of \$18,168.34 or 47 per cent. together with an increase in interest charges—largely due to the increase in the power plants—amounting to \$19,294.73 or 54 per cent., prevented this System from giving as favourable an operating statement as was anticipated, the actual cost of the service exceeding the estimate by about 22 per cent. With the restoration of normal conditions, satisfactory operating results are confidently anticipated.

EUGENIA SYSTEM

This System having a large storage capacity, is used during periods of the day to supply power to the Severn System, and credit is allowed this System on account of such power supplied. The dropping off, however, of munition loads on the Severn System reduced the amount of power used by that System during the year, and seriously affected the revenue of the Eugenia System.

The operation and maintenance expense increased by \$17,493.41, or 50.7 per cent. over the previous year, and the interest charges increased \$8,708.52, or 17.1 per cent. over those of 1918. However, the actual cost of operation, maintenance and the necessary fixed charges only exceeded the estimate by approximately 5.9 per cent.

During the year a large number of municipalities in the Bruce Peninsula applied to the Commission for power, and many of them are arranging to submit Hydro By-laws to their electors at the coming municipal elections. It is expected that with nominal rate adjustments and these additional loads the financial operation of this System will be entirely satisfactory.

WASDELL'S SYSTEM

The generating plant of the Wasdell's System differs from the other generating plants supplying power in the Northern District, in that it does not depend on the storage of water for its continuous maximum output, and this characteristic is of considerable value to the municipalities in the Northern District, as all the generating plants in this district, with the exception of the Muskoka System, are tied together, and power may be used to maximum capacity of this plant throughout the day so as to permit the other generating plants in the district to increase their water storage.

The cost of service during the year increased the amount of the power bills as rendered, by \$2,490.01, or 7.7 per cent., due to the fact that the operation and maintenance expenses increased 18.5 per cent., and the interest charges 8.3 per cent., while at the same time the decrease in demand for power for munition plants on the Severn System, cut down the transfer of power to that System. Plans are under way to secure additional load to the capacity of the generating plant.

MUSKOKA SYSTEM

The operation and maintenance expenses of this System increased \$2,235.54, or 26 per cent. over the figure for 1918, and the interest charges increased over the figures for 1918 by \$871.62, or approximately 11 per cent. This large increase in operating expenses, with a fixed revenue from the Anglo-Canadian Leather Company, which is being supplied with power under a long-term contract at a rate based on normal operating expenses, resulted in this System operating with a deficit for the year of \$2,469.32.

Arrangements are now being made to increase the amount of power available on this System, for which a demand already exists, which should place the operation of this System on a more satisfactory basis.

ST. LAWRENCE SYSTEM

The operation of this System was first commenced in December, 1913, a contract being made with the M. F. Beach Power Company for 500 horsepower to supply power to the municipalities in this district.

In order to supply the increased loads in the district and to supply power to other municipalities which had made application to the Commission, a contract was made with the Cedars Rapids Transmission Company, this power being delivered at a high-tension station constructed at Cornwall. Power was first received from this new station on May 1st, 1919. This extension increased the capital expenditure from approximately \$180,000 to over \$570,000, and the load supplied in this district increased from less than 500 horsepower to over 2,000 horsepower during the last six months of the year.

The actual cost of operation, maintenance and the necessary fixed charges for the year increased by \$6,078.93, or approximately 11 per cent. The load is growing rapidly and more favourable results are anticipated during 1920.

THUNDER BAY SYSTEM

During the past ten years power has been supplied to Port Arthur by the Commission under a contract for power received from the Kaministiquia Power Company. This contract expires in December, 1920, and at the request of the municipalities in this district, the Commission commenced the construction of a development on the Nipigon River at Cameron's Falls, in the fall of 1918.

The ultimate capacity of this plant will be 75,000 horsepower. The first installation will have a capacity of approximately 30,000 horsepower, and it is expected that the plant will be ready for operation about December 1st, 1920.

RIDEAU SYSTEM

Power was first supplied to this System from the Merrickville plant where the Commission had a contract for 500 horsepower, and while this plant was sufficient to supply the needs of the district during the first year's operation, the rapid growth in the loads of the municipalities supplied necessitated the Commission going ahead with the development of High Falls on the Mississippi River, which development, when completed, will supply approximately 3,000 horsepower. The first unit of this plant will be put into operation about May, 1920.

CENTRAL ONTARIO SYSTEM

Just prior to the signing of the Armistice, this System was fully loaded and the installation of a third generating unit of 3,750 k.v.a. capacity was in progress at Healey Falls in order to meet the increasing demand. When the war terminated, the munitions load fell off abruptly, the decrease being nearly 30 per cent. of the total pre-armistice load. After a period of quiescence, new loads began to develop so that by the beginning of the last quarter of the year normal conditions had again returned. As a consequence of the inactive period the revenues of the Power Department declined by 30 per cent., and of the Local

Systems by 11 per cent from those of the previous year. Advancing wage rates and material costs resulted in an increase of 12 per cent. in the cost of operation of the Power Department, while the operating costs of the Local Systems declined by 10 per cent. owing to decreased power demand. The fixed charges of the Power Department increased by 12 per cent. owing to completion of the Healey Falls development and, as during the greater part of the year the capacity of the new unit was not required, this increased the burdens of the System without bringing any compensating revenue.

The operation of the Pulp Mill, which had been profitable previously, was conducted at a loss this year owing to low market prices and advancing manufacturing costs. Since the end of the year market conditions have entirely changed and the operations of the mill are now yielding very large profits.

Since August, 1919, the demand for power on this System has increased to such an extent that all available generating plants are fully loaded and construction work on a new 10,000 horsepower development at Ranney's Falls will be commenced this spring.

It is expected that the increased loads will return sufficient revenue to bring about profitable operation in almost all municipalities and that in cases where rate increases are necessary through rising costs, these increases will not be large.

NIPISSING SYSTEM

The increase in loads on this System during the year was such that the demand for power exceeded the capacity of the hydraulic generating plant and necessitated the operation of the steam plant during low-water periods of the year. The operation of this steam plant, with the increased cost of coal as well as the increased cost of operation and maintenance of the plant, seriously handicapped the System and resulted in a net operating loss for the year amounting to \$1,089.53.

The installation of storage dams will be completed some time during the coming summer, so that during periods of high water, the water supply may be stored, and thereby obviate the necessity of operating the steam plant during low water periods, and with this change the operation of the plant should show a good surplus.

The Commission submits its Report with a feeling of satisfaction knowing full well that its activities have been subjected to an enquiry of the most searching nature, the result of which is a vindication of the policy of public ownership and operation of electrical utilities, and of the Commission's methods of management and operation.

The Commission feels this to be a fitting opportunity of acknowledging the untiring zeal and faithful attention to duty on the part of all officers and members of its staff.

Respectfully submitted,

ADAM BECK,

Chairman.

TORONTO, ONT., February 25th, 1919.

COLONEL SIR ADAM BECK, Kt., LL.D.,

*Chairman, Hydro-Electric Power Commission of Ontario,
Toronto, Ont.*

SIR,—I have the honour to transmit herewith the Twelfth Annual Report of the Hydro-Electric Power Commission of Ontario for the fiscal year ending October 31st, 1919.

I have the honour to be,

Sir,-

Your obedient servant,

W. W. POPE,

Secretary.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

COLONEL SIR ADAM BECK, Kt., LL.D., Chairman.

HONOURABLE I. B. LUCAS, M.P.P.

LT. COL. HON. D. CARMICHAEL, D.S.O., M.C.

W. W. POPE, Secretary.

F. A. GABY, Chief Engineer.

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TWELFTH ANNUAL REPORT
OF THE
Hydro-Electric Power Commission
of Ontario

SECTION I
LEGAL PROCEEDINGS

ACTS

An Act to amend The Power Commission Act and to Ratify certain
By-laws and Contracts.

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:

1. This Act may be cited as *The Power Commission Amendment Act, 1919*. Short title.

2. *The Power Commission Act* is amended by adding after section 6c, as enacted by *The Power Commission Act, 1918*, the following section: Rev. Stat.,
c. 39,
amended.

6cc. The Commission, with the approval of the Lieutenant-Governor in Council, may establish a fund for the payment to permanent employees of the Commission, of superannuation and retiring allowances, or of a gratuity or annual allowance to the dependants of employees dying while in the service of the Commission, and a fund for providing sick benefits for permanent employees, and may provide for contributions to such fund by the Commission and by its employees, or for the establishment and support of such fund entirely at the cost of the Commission. Authority
for establishment
of superannuation
fund.

6ccc. The Commission, with the approval of the Lieutenant-Governor in Council, may enter into an agreement with the corporation of any municipality receiving power from the Commission for including permanent employees of any commission established under *The Public Utilities Act*, or under this Act, for the management and control of works for the distribution of electrical power or energy in the municipality, upon such terms as to the contribution by a municipal corporation and otherwise as may be deemed expedient. Agreements
to include
municipal
employees.

Rev. Stat.,
c. 39, s. 23,
cl. c, is
amended.

Charging
appropria-
tions for
superannu-
ation.

By-laws
confirmed.

Certain
municipali-
ties added
as parties
to Niagara
contract.

3. Clause *c* in section 23 of *The Power Commission Act*, as amended by section 4 of *The Power Commission Act, 1914*, and subsection 1 of section 11 of *The Power Commission Act, 1915*, is further amended by adding after the words "Consolidated revenue fund," the words, "and such sums as may be appropriated for the establishment and support of any fund established by the Commission for the payment of superannuation or retiring allowances and sick benefits, or either of them, to the permanent employees of the Commission."

4. By-law No. 352 of the Corporation of the Village of Chippawa, By-law No. 524 of the Corporation of the Village of Sandwich, By-law No. 8 of the Corporation of the Village of Zurich, By-law No. 485 of the Corporation of the Village of Baden, By-law No. 802 of the Township of Markham, covering the Police Village of Unionville; By-law No. 739 of the Township of Caledon, covering the Police Village of Alton; By-laws Nos. 1188 and 1189 of the Corporation of the Township of Etobicoke, By-law No. 1097 of the Corporation of the Township of Barton, By-law No. 1363 of the Corporation of the Town of Smith's Falls, By-laws Nos. 629 and 630 of the Corporation of the Township of Ancaster, By-law No. 638 of the Corporation of the Township of East Flamboro, By-law No. 654 of the Corporation of the Township of Brock, By-law No. 552 of the Corporation of the Township of Wilmot, By-law No. 788 of the Corporation of the Township of Oxford East, By-law No. 492 of the Corporation of the Township of Nissouri East, By-laws Nos. 982 and 1008 of the Corporation of the Township of Vaughan, By-law No. 550, as amended by By-law No. 259 of the Corporation of the Township of West Gwillimbury; By-law No. 492, as amended by By-law No. 516 and By-laws Nos. 493 and 494 of the Corporation of the Township of Innisfil, By-law No. 404, as amended by By-law No. 414 and By-laws Nos. 405 and 406 of the Corporation of the Township of Essa; By-law No. 501, as amended by By-law No. 512 of the Corporation of the Township of Tecumseth; By-law No. 720 of the Corporation of the Township of London, By-laws Nos. 726, 745 and 746 of the Corporation of the Township of Brantford, By-law No. 217 of the Corporation of the Town of Mimico, By-law No. 1014 of the Corporation of the Township of Whitby, By-law No. 7999, as amended by By-law No. 8018 and by By-law No. 8052 of the Corporation of the City of Toronto, and all debentures issued or to be issued, or purporting to be issued, under any of the said by-laws which authorize the issue of debentures, are confirmed and declared to be legal, valid and binding upon such corporations and the ratepayers thereof, respectively, and shall not be open to question upon any ground whatsoever, notwithstanding the requirements of *The Power Commission Act*, or the amendments thereto, or any other Act of this Legislature.

5. The Municipal Corporation of the Village of Chippawa, the Municipal Corporation of the Village of Sandwich, the Corporation of the Village of Zurich, the Municipal Corporation of the Village of Baden, the Police Village of Unionville, the Municipal Corporation of the Township of Etobicoke, and the Municipal Corporation of the Township of Barton, are added as parties of the second part of the contract set out in

Schedule "A" to *The Power Commission Act, 1909*, as varied, confirmed and amended by the Act passed in the tenth year of the reign of His Late Majesty King Edward VII, chaptered 16, and by subsequent Acts and by this Act, and the said contract shall be binding upon the parties thereto respectively from, as to the Village of Chippawa, from the 22nd day of January, 1919; as to the Village of Sandwich, from the 18th day of February, 1915; as to the Village of Zurich from the 4th day of April, 1916; as to the Village of Baden from the 29th day of August, 1911; as to the Police Village of Unionville from the 23rd day of January, 1919; as to the Township of Etobicoke from the 1st day of April, 1918, and as to the Township of Barton from the 16th day of September, 1918.

6. The names of the said municipalities are added to Schedule "B" of the said contract, and such schedule shall be read as containing the particulars set out in Schedule "A" to this Act. Names of municipalities added to schedule.

7. The agreements set out in Schedules "B," "C," "D," "E," "F," "G," "H," "I," "J," "K," "L," "M," "N," "O," "P," "Q," and "R," between the Village of Neustadt, the Village of Neustadt (Purchase agreement), the Police Village of Alton, the Township of East Flamboro, the Township of Brock, the Township of Wilmot, the Township of East Oxford, the Township of East Nissouri, the Township of Vaughan, His Majesty the King, represented therein by the Minister of Railways and Canals of Canada, the National Portland Cement Company, Limited, the National Abrasive Company, the Department of Education of the Province of Ontario, the Essex County Light and Power Company, Limited, and the Detroit Edison Company, the Wolverton Milling Company, Limited, the Toronto Suburban Railway Company, James Battle, and the Canadian Salt Company, Limited, and the Commission are hereby confirmed and declared to be legal, valid and binding upon the parties thereto respectively and shall not be open to question upon any ground whatsoever, notwithstanding the requirements of *The Power Commission Act*, or amendments thereto, or any other Act of this Legislature. Contracts confirmed.

8. This Act shall come into force and take effect on the day upon which it receives the Royal Assent. Commencement of Act.

AGREEMENTS

SCHEDULE "A."

Name of Municipal Corporation.	Quantity of Power Applied for in H.P.	Maximum Price of Power at Niagara Falls.	Number of Volts.	Estimate maximum cost of power ready for distribution in Municipality.	Estimated proportionate part of cost to construct transmission line, transformer station and works for nominally 30,000 h.p. with total capacity of 60,000 h.p.	Estimate proportionate part of line loss and of part cost to operate, maintain, renew and insure transmission line, transformer stations and works for nominally 30,000 h.p. with total capacity of 60,000 h.p.
				\$ c.	\$ c.	\$ c.
Chippawa	25	..	..	\$35 00	\$4,165 00	\$234 00
Sandwich	200	..	..	..	..	..
Zurich	50	..	..	69 34	24,244 00	1,419 00
Baden	40	..	..	36 95	8,316 00	620 00
Unionville	40	..	..	48 82	12,233 00	648 00
Etobicoke Township ..	175	..	..	27 00	25,375 00	1,219 00
Barton Township	200	..	..	14 00	8,980 00	47,916 00

This Agreement dated the 22nd day of January, 1919.

Between

Hydro-Electric Power Commission of Ontario, herein called the "Commission," party of the first part;

and

Municipal Corporation of the Village of Chippawa, herein called the "Corporation," party of the second part.

Whereas the City of Toronto and other municipalities named in column 1 of the schedule of the agreement dated 4th May, 1908, hereto attached and marked "A," have agreed with the Commission for a supply of power from Niagara Falls;

And whereas the Corporation, under the provisions of the *Power Commission Act* and amendments thereto, Revised Statutes of Ontario, chapter 39, has applied to the Commission for a supply of power and has passed a by-law, No. 352, passed the 26th day of July, 1918, to authorize the execution of an agreement therefor;

Now this indenture witnesseth that in consideration of the premises the Commission agrees to supply to the Corporation twenty-five (25) horsepower of electrical power upon the terms and conditions set forth in said agreement of 4th May, 1908, and the Corporation agrees with the Commission upon the said terms and conditions therein set out. Provided that the said terms and conditions may be modified pursuant to paragraph 11 of the said agreement, but subject to such modifications, the Corporation shall be deemed to have been a party to the said agreement, and the figures set forth in the columns of the schedule of the said agreement hereto attached opposite the name of the Village of Chippawa shall be deemed to have been inserted therein at the date thereof.

In witness whereof the Commission and the Corporation have respectively affixed their Corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

(Signed) A. BECK, *Chairman.*

(Seal.)

(Signed) W. W. POPE, *Secretary.*

CORPORATION OF THE VILLAGE OF CHIPPAWA.

(Signed) CHARLES KISTER, *Reeve.*

(Seal.)

(Signed) CHAS. WAINBRUNNER, *Clerk.*

This Indenture made the 4th day of May, 1908.

Between

The Hydro-Electric Power Commission of Ontario, acting herein on its own behalf and with the approval of the Lieutenant-Governor in Council (hereinafter called the Commission), party of the first part;

and

The Municipal Corporations of Toronto, London, Guelph, Stratford, St. Thomas, Woodstock, Berlin, Galt, Hespeler, St. Mary's, Preston, Waterloo, New Hamburg, and Ingersoll (hereinafter called the Corporations), parties of the second part.

Whereas, pursuant to "An Act to provide for transmission of electrical power to municipalities," the Corporations applied to the Commission to transmit and supply such power from Niagara Falls, and the Commission entered into contracts, hereto attached, with the Ontario Power Company of Niagara Falls (hereinafter called the Company), for such power at the prices set forth in the schedule, hereto attached, and the Commission furnished the Corporations with estimates, as shown in the schedules of the total cost of such power, ready for distribution within the limits of the Corporations, and the electors of the Corporations assented to by-laws authorizing the Corporations to enter into a contract with the Commission for such power, and the Commission have estimated the line cost and the cost to construct, operate, maintain, repair, renew and insure a line to transmit, nominally,

30,000 horsepower with a total capacity of 60,000 horsepower of such power to the Corporations, and have apportioned the part of such cost to be paid by each Corporation as shown in said schedule;

Now, therefore, this Indenture witnesseth that in consideration of the premises and of the agreements of the Corporations herein set forth, subject to the provisions of said Act and of the said contracts, the Commission agrees with the Corporations respectively:—

1.—(a) To construct a line to transmit the quantities of electric power, shown in column 2 of the said schedule from Niagara Falls to the Corporations shown in column 1, respectively.

(b) On the 1st day of July, 1919, or on any earlier day on which the Commission shall be prepared to supply the same, to supply said power in quantities set forth in column 2 of said schedule, or as a minimum 40 per cent. less, if written notice of minimum required is given on or before 19th July, 1919, to the Corporations within the limits thereof, ready for distribution at approximately the number of volts set forth in column 4 of said schedule, and approximately 25 cycles per second frequency.

(c) At the expiration of three months' written notice, which may be given by the Corporations or any of them from time to time during the continuance of this agreement, to supply from time to time to the Corporations in blocks of not less than 1,000 horsepower each, additional power until the total amount so supplied shall amount to 30,000 horsepower.

(d) At the expiration of nine months' like notice, which may be given by the Corporations or any of them from time to time during the continuance of this agreement, to supply from time to time to the Corporations in blocks of not less than 1,000 horsepower each, additional power until the total amount so supplied shall amount to 100,000 horsepower.

(e) To use at all times first-class, modern, standard, commercial apparatus and plant and to exercise all due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Corporations.

In consideration of the premises and of the agreements herein set forth, each of the Corporations for itself, and not one for the other, agrees with the Commission:—

2.—(a) Subject to the provisions of paragraph 2 (g), hereof, to pay the Commission for the quantities of power shown in column 2 of said schedule, or 40 per cent. less as a minimum, to be supplied at said date, and for such additional power supplied or held in reserve upon such notices, the price set forth in column 3 of said schedule in twelve monthly payments, in gold coin of the present standard of weight and fineness, and bills shall be rendered by the Commission on or before the fourth and paid by the Corporation on or before the fifteenth of each month. If any bill remains unpaid for 15 days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of such power to the Corporations in default until said bill is paid. No such discontinuance shall relieve the Corporation in default from the performance of the covenants, provisoes, and conditions herein contained. All payments in arrears shall bear interest at the legal rate.

(b) To take electric power exclusively from the Commission during the continuance of this agreement; provided, if the Commission is unable to supply said power as quickly as required, the Corporations may obtain the supply otherwise until the Commission has provided such supply; thereupon the Corporations shall immediately take from the Commission; and the Corporations may generate, store or accumulate electric power for emergencies, or to keep down the peak load of the power taken from the Commission; and nothing herein contained shall affect existing contracts between the Corporations and other parties for a supply of electric power, but the Corporations shall determine said contracts at the earliest dates possible.

(c) To pay, annually, interest upon its proportionate part of the moneys expended by the Commission on capital account for the construction of the said line, transformer stations and other necessary works, shown, respectively, in column 6 of said schedule, subject to adjustment under paragraph 10.

(d) To pay an annual sum for its proportionate part of the cost of the construction of said line, stations and works, shown, respectively, in column 6 of said schedule, subject to adjustment under paragraph 10, so as to form in thirty years a sinking fund for the retirement of the securities to be issued by the Province of Ontario.

(e) To bear its proportionate part of the lines loss and pay its proportionate part of the cost to operate, maintain, repair, renew and insure the said line, stations and works, shown, respectively, in column 7 of said schedule, subject to adjustment under paragraph 10.

(f) To keep, observe and perform the covenants, provisoes and conditions set forth in said contracts, intended by the Commission and the Company to be kept and observed and performed by the Corporations.

(g) To pay for three-fourths of the power supplied and held in reserve at said date and upon said notices, whether the said power is taken or not, and when the greatest amount of power taken for twenty consecutive minutes in any month shall exceed three-fourths of the amount during such twenty consecutive minutes, so supplied and held in reserve, to pay for this greater amount during that entire month. When the power factor of the greatest amount of power taken for said twenty minutes falls below 90 per cent., the Corporations shall pay for 90 per cent. of said power divided by the power factor.

(h) To take no more power than the amount to be supplied and held in reserve at said date and upon said notices.

(i) To use at all times first-class, modern, standard, commercial apparatus and plant to be approved by the Commission.

(j) To exercise all due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Commission and the Company.

3. If, as therein provided, the said contracts are continued until 19th December, 1939, this agreement shall remain in force until that date.

4. Said power shall be three-phase, alternating, commercially continuous twenty-four-hour power every day of the year except as provided in para-

graph 6 hereof, and shall be measured by curve-drawing meters, subject to test as to accuracy by either party hereto.

5. The engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement to inspect the apparatus, plant and property of the Corporations, and take records at all reasonable times on giving to the Corporation six hours' notice of the intention to make such inspection. The Corporations shall have a like right on giving a like notice to inspect the apparatus, plant and property of the Commission.

6. In case the Commission or the Company shall at any time or times be prevented from supplying said power, or any part thereof, or in case the Corporations shall at any time be prevented from taking said power, or any part thereof, by strike, lock-out, riot, fire, invasion, explosion, act of God or the King's enemies, or any other cause reasonably beyond their control, then the Commission shall not be bound to deliver such power during such time and the Corporations shall not be bound to pay the price of said power at Niagara Falls during such time, but the Corporations shall continue to make all other payments, but as soon as the cause of such interruption is removed the Commission shall, without any delay, supply said power as aforesaid and the Corporations shall take the same and each of the parties hereto shall be prompt and diligent in removing and overcoming such cause or causes of interruption.

7. If, and so often as, any interruption shall occur in the service of the Company, due to any cause or causes, other than those provided for by the next preceding paragraph hereof, the Commission shall recover and pay to the Corporations as liquidated and ascertained damages and not by way of penalty, as follows:—For any interruption less than one hour, double the amount payable for power which should have been supplied during the time of such interruption; and for any interruption of one hour or more, the amount payable for the power which should have been supplied during the time of such interruption and twelve times the last mentioned amount in addition thereto, and all moneys payable under this paragraph when the amount thereof is settled between the Commission and the Company may be deducted from any moneys payable by the Corporations to the Commission, but such right of deduction shall not in any case delay the said monthly payments.

8. The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the sub-station in the limits of the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder; and when voltage and frequency are so maintained, the amount of the power, its fluctuations, load factor, power factor, distribution as to phases, and all other electric characteristics and qualities are under the sole control of the Corporations, their agents, customers, apparatus, appliances and circuits.

9. In case any municipal corporation, or any person, firm or corporation which shall contract with the Commission or with any municipal corporation for a supply of power furnished to the Commission by the Company shall suffer damages by the act or neglect of the Company, and such municipal corporation, person, firm or corporation would, if the Company had made

the said contracts directly with them, have had a right to recover such damages or commence any proceedings or any other remedy, the Commission shall be entitled to commence any such proceeding or bring such action for or on behalf of such municipal corporation, person, firm, or corporation, and notwithstanding any acts, decision or rule of law to the contrary, the Commission shall be entitled to all the rights and remedies of such municipal corporation, person, firm or corporation, including the right to recover such damages, but no action shall be brought by the Commission until such municipal corporation, person, firm or corporation shall have agreed with the Commission to pay any costs that may be adjudged to be paid if such proceeding or action is unsuccessful. The rights and remedies of any such municipal corporation, person, firm or corporation shall not be hereby prejudiced.

10. The Commission shall at least annually adjust and apportion the amounts payable by municipal corporations for such power and such interest, sinking fund, line loss, and cost of operating, maintaining, repairing, renewing and insuring the line and works.

11. If at any time, any other municipal corporation, or pursuant to said Act, any railway or distributing company or any other corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the Corporations, parties hereto, in writing, of a time and place and hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporations, parties hereto, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said line is not adequate for such supply, or if the supply of the Corporations, parties hereto, will be thereby injuriously affected, and no power shall be supplied within the limits of a municipal corporation taking power from the Commission at the time of such application, without the written consent of such corporation.

In determining the quantity of power supplied to a municipal corporation, the quantity supplied by the Commission within the limits of the corporation to any applicant other than a municipal corporation, shall be computed as part of the quantity supplied to such corporation, but such corporation shall not be liable to pay for the power so supplied, or otherwise in respect thereof. No power shall be supplied by any municipal corporation to any railway or distributing company, or any other corporation or person without the written consent of the Commission.

12. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporations and other municipal corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporations and other municipal corporations, supplied

by the Commission having regard to the amounts paid by them, respectively, under the terms of this agreement, and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

13. Each of the Corporations agrees with the other:—

(a) To take electric power exclusively from the Commission during the continuance of this agreement, subject to the provisos above set forth in paragraph 2 (b).

(b) To co-operate, by all means in its power, at all times, with the Commission, to increase the quantity of power required from the Commission, and in all other respects to carry out the objects of this agreement and of the said Act.

14. If differences arise between the Corporations, the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties and the Commission shall, in a summary manner, when possible, adjust such differences and such adjustment shall be final. The Commission shall have all the powers that may be conferred upon a Commissioner appointed under *The Act respecting Enquiries concerning Public Matters*.

15. This agreement shall extend to, be binding upon and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporations have, respectively, affixed their corporate seals and the hands of their proper officers.

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

Commissioners.

SCHEDULE.

Column 1	2	3	4	5	6	7
Name of Municipal Corporation.	Quantity of power applied for in h.p.	Maximum price of power at Niagara Falls.	No. of volts.	Estimate maximum cost of power ready for distribution in municipality.	Estimate proportionate part of cost to con- struct transmission line, transformer sta- tions and works for nominally 30,000 h.p., with total capacity of 60,000 h.p.	Estimate proportionate part of line loss and of part of cost to operate, maintain, repair, renew and insure transmission line, transformer stations and works for nominally 30,000 h.p., with total capacity of 60,000 h.p.
Toronto	10,000	\$9.40 for power at 12,000 volts until 25,000 h.p. or more are taken, then \$9.00 for all. \$10.40 for power at 60,000 volts until 25,000 h.p. or more are taken, then \$10.00 for all. If power taken at higher voltage, price to be fixed by arbitration.	Number required by each corporation.	\$18 10	\$828,080	\$38,970
London	5,000			23 50	671,089	31,578
Guelph	2,500			24 00	347,420	16,350
Stratford	1,000			27 10	173,580	8,120
St. Thomas	1,500			26 50	244,140	11,490
Woodstock	1,200			23 00	155,350	7,310
Berlin	1,000			24 00	138,970	6,540
Galt	1,200			22 00	143,920	6,773
Hespeler	300			26 00	63,200	2,974
St. Mary's	500			29 50	95,677	4,502
Preston	600			23 50	80,530	3,789
Waterloo	685			24 50	98,460	4,630
New Hamburg ..	250			29 50	47,830	2,251
Ingersoll	500			24 00	69,485	3,270
Chippawa	25			35 00	4,165	234

SCHEDULE "B."

This Indenture made in duplicate the 10th day of June, in the year of our Lord, 1918.

Between

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part;

and

The Municipal "Corporation of the Village of Neustadt, hereinafter called the "Corporation," party of the second part.

Whereas, pursuant to an Act to provide for the transmission of electrical power to municipalities known as the *Power Commission Act*, and amendments thereto, the Corporation applied to the Commission for a supply of power, and the Commission furnished the Corporation with estimates of the total cost of such power, ready for distribution within the limits of the Corporation (and the electors of the Corporation assented to the by-law authorizing the Corporation to enter into a contract with the Commission for such power);

1. Now therefore this indenture witnesseth that in consideration of the premises and of the agreement of the Corporation herein set forth, subject to the provisions of the said Act and amendments thereto, the Commission agrees with the Corporation:

(a) To reserve and deliver at the earliest possible date one hundred (100) H.P. or more of electrical power to the Corporation;

(b) At the expiration of reasonable notice in writing, which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electric power when called for;

(c) To use at all times first-class, modern, standard, commercial apparatus and plant, and to exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Corporation;

(d) To deliver commercially continuous 24-hour power every day in the year to the Corporation at the Corporation's limits.

2. In consideration of the premises and of the agreement herein set forth, the Corporation agrees with the Commission:

(a) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement so as to be able to receive power when the Commission is ready to deliver same;

(b) To pay annually, interest at rate payable by the Commission upon the Corporation's proportionate part (based on the quantity of electrical energy or power taken), of all monies expended by the Commission on

capital account for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations, and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract.

Also to pay an annual sinking fund instalment of such amount as to form at the end of 30 years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all monies advanced by the Province of Ontario, for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other work necessary for the delivery of said electrical energy or power, delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, of the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary work. Subject to adjustment under clause 6 of this agreement;

(c) The amounts payable under this contract shall be paid in twelve monthly payments, in gold coin of the present standard of weight and fineness, at the offices of the Commission at Toronto. Bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate;

(d) To take electric power exclusively from the Commission during the continuance of this agreement;

(e) To co-operate by all means in its power at all times with the Commission to increase the quantity of power required from the Commission, and in all other respects to carry out the objects of this agreement, and of the said Act;

(f) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided, whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month;

(g) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for and on the part of the Commission to hold in reserve such increased quantity of power in accordance with the terms and conditions of this contract;

(h) When the power factor at any time falls below ninety per cent. (90%), the Corporation shall pay for ninety per cent. (90%) of the kilovolt amperes, providing that said ninety per cent. (90%) of said kilovolt amperes is greater than the maximum kilowatts for any twenty (20) minute period during the month;

(i) To use at all times, first-class, modern, standard, commercial apparatus and plant, to be approved by the Commission;

(j) To exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Commission and of the Corporation.

3. This agreement shall remain in force for thirty years from date of the first delivery of power under this contract.

4. The power shall be alternating, three phase, having a periodicity of approximately 60 cycles per second and shall be delivered as aforesaid at a voltage suitable for local distribution.

(a) That the meters with their series and potential transformers shall be connected at the point of delivery;

(b) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the sub-station in the limits of the Corporation shall constitute the supply of all power involved therein and the fulfilment of all operating obligations hereunder, and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases and all other electric characteristics and qualities, are under the sole control of the Corporation, their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission shall have the right from time to time during the continuance of this agreement to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. The Commission shall at least annually adjust and apportion the amount or amounts payable by the Municipal Corporation or Corporations for such power and such interest, sinking fund, cost of lost power and cost of generating, operating, maintaining, repairing, renewing and insuring said works.

If at any time any other Municipal Corporation, or pursuant to said Act, any railway or distributing company, or any other Corporations or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the involved Corporation or Corporations in writing, of a time and place to hear all representations that may be made as to the terms and conditions of such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said works or any part thereof are not adequate for such supply, or if the supply of the Corporation will be thereby injuriously affected, and no power shall be supplied within the limits of a municipal Corporation taking power from the Commission at the time of such application without the written consent of such Corporation.

In determining the quantity of power supplied to a Municipal Corporation, the quantity supplied by the Commission within the limits of the Corporation to any applicant, other than a Municipal Corporation shall be computed as part of the quantity supplied to such Corporation, but such Corporation shall not be liable for payment for any portion of the power so supplied. No power shall be supplied by the Municipal Corporation to any railway or distributing Company without the written consent of the Commission. Power shall not be sold for less than the cost and there shall be no discrimination as regards price and quantity.

7. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation or Corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all monies expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and any other (if any) supplied by the Commission having regard to the amounts paid by them respectively under the terms of this agreement, and such other consideration as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

8. If differences arise between Corporations to which the Commission is supplying power, the Commission may upon application fix a time and place and hear all representations that may be made by the parties and the Commission shall, in a summary manner, when possible, adjust such differences and such adjustment shall be final. The Commission shall have all the powers that may be conferred upon a Commissioner appointed under *The Act respecting Enquiries concerning Public Matters*.

9. This agreement shall extend to, be binding upon, and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

A. BECK, *Chairman*.

(Seal)

W. W. POPE, *Secretary*.

MUNICIPAL CORPORATION OF THE VILLAGE OF NEUSTADT.

JOSEPH WEBER, *Reeve*.

JACOB C. HEUTHER, *Clerk*.

NOTE

For Schedule "C" see Ontario Statutes,
9 Geo. V, 1919, Chap. 16, p. 112

SCHEDULE "D."

This indenture made in duplicate the 3rd day of January in the year of our Lord, 1919,

Between

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," party of the first part;

and

The Police Village of Alton, located in the Township of Caledon, Peel County, Ontario, hereinafter called the "Corporation," party of the second part.

Whereas, pursuant to an Act to provide for the transmission of electrical power to municipalities, known as the *Power Commission Act* and amendments thereto, the Corporation applied to the Commission for a supply of power, and the Commission furnished the Corporation with estimates of the total cost of such power, ready for distribution within the limits of the Corporation (and the electors of the Corporation consented to the By-laws authorizing the Corporation to enter into a contract with the Commission for such power).

1. Now, therefore, this indenture witnesseth:

That in consideration of the premises and of the agreement of the Corporation herein set forth subject to the provisions of the said Act and amendments thereto, the Commission agrees with the Corporation:

(a) To reserve and deliver at the earliest possible date one hundred horsepower (100 H.P.) or more of electrical power to the Corporation;

(b) At the expiration of reasonable notice in writing which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electrical power when called for;

(c) To use at all times, first-class, modern, standard, commercial apparatus and plant, and to exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Corporation;

(d) To deliver commercially continuous twenty-four (24) hour-power every day in the year to the Corporation at the distribution bus bars in the Commission's substation within the Corporation's limits.

2. In consideration of the premises and of the agreements herein set forth, the Corporation agrees with the Commission:

(a) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement so as to be able to receive power when the Commission is ready to deliver same;

(b) To pay annually, interest at rate payable by the Commission upon the Corporation's proportionate part, (based on the quantity of electrical

energy or power taken), of all monies expended by the Commission on capital account for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other works necessary for the delivery of said electrical energy or power to the Corporation under the terms of this contract.

Also to pay an annual sinking fund instalment of such amount as to form at the end of thirty (30) years, with accrued interest, a sinking fund sufficient to repay the Corporation's proportionate part, based as aforesaid, of all monies advanced by the Province of Ontario, for the acquiring of properties and rights, the acquiring and construction of generating plants, transformer stations, transmission lines, distributing stations and other work necessary for the delivery of said electrical energy and power, delivered to the Corporation under the terms of this contract. Also to pay the Corporation's proportionate part, based as aforesaid, of the cost of lost power and of the cost of operating, maintaining, repairing, renewing and insuring said generating plants, transformer stations, transmission lines, distributing stations and other necessary works. Subject to adjustment under Clause 6 of this agreement;

(c) The amounts payable under this contract shall be paid in twelve monthly payments, in gold coin of the present standard of weight and fineness, at the offices of the Commission at Toronto. Bills shall be rendered by the Commission on or before the fifth day and paid by the Corporation on or before the fifteenth day of each month. If any bill remains unpaid for fifteen days the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate;

(d) To take electric power exclusively from the Commission during the continuance of this agreement;

(e) To co-operate by all means in its power at all times with the Commission to increase the quantity of power required from the Commission and in all other respects to carry out the objects of this agreement and of the said Act;

(f) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided whether it takes the same or not. When the highest average amount of power taken for any twenty (20) consecutive minutes during any month shall exceed during the twenty (20) consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month;

(g) If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty (20) consecutive minutes the taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for, and on the part of the Commission to hold in reserve, such increased quantity of power in accordance with the terms and conditions of this contract;

(h) When the power factor of the highest average amount of power taken for said twenty (20) consecutive minutes, falls below ninety per cent. (90%) the Corporation shall pay for ninety per cent. (90%) of the kilovolt amperes, providing that said ninety per cent. (90%) of the said kilovolt amperes is greater than the maximum kilowatts for any twenty (20) minute period during the month;

(i) To use at all times first-class, modern, standard, commercial apparatus and plant, to be approved by the Commission;

(j) To exercise all due skill and diligence so as to secure satisfactory operation of the plant and apparatus of the Commission and of the Corporation.

3. This agreement shall remain in force for thirty (30) years from date of the first delivery of power under this contract.

4. The power shall be alternating, three-phase, having a periodicity of approximately sixty (60) cycles per second and shall be delivered at a voltage suitable for local distribution.

(a) The meters with their series and potential transformers shall be connected at the point of delivery within the substation serving the district;

(b) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the limits of the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder, and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases and all other electric characteristics and qualities are under the sole control of the Corporations, their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. The Commission shall, at least annually adjust and apportion the amount or amounts payable by the Municipal Corporation or Corporations for such power and such interest, sinking fund, cost of lost power and cost of generating, operating, maintaining, repairing, renewing and insuring said works.

If at any time any other Municipal Corporation, or pursuant to said Act, any railway or distributing company, or any other Corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the involved Corporation or Corporations in writing, of a time and place to hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the prices to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions, as may, having regard to the risk and expense

incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

No such application shall be granted if the said works or any part thereof are not adequate for such supply, or if the supply of the Corporation will be thereby injuriously affected, and no power shall be supplied within the limits of a Municipal Corporation taking power from the Commission at the time such application is made without the written consent of such Corporation.

In determining the quantity of power supplied to a Municipal Corporation, the quantity supplied by the Commission within the limits of the Corporation to any applicant, other than a Municipal Corporation, shall be computed as part of the quantity supplied to such Corporation, but such Corporation shall not be liable for payment for any portion of the power so supplied. No power shall be supplied by the Municipal Corporation to any railway or distributing Company without the written consent of the Commission. Power shall not be sold for less than the cost and there shall be no discrimination as regards price and quantity.

7. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation or Corporations supplied by the Commission but the Commission shall be entitled to a lien upon said property for all monies expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and any other (if any) supplied by the Commission, having regard to the amounts paid by them respectively under the terms of this agreement, and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

8. If differences arise between Corporations to which the Commission is supplying power, the Commission may, upon application, fix a time and place and hear all representations that may be made by the parties and the Commission shall, in a summary manner, when possible, adjust such differences and such adjustment shall be final. The Commission shall have all the powers that may be conferred upon a Commissioner appointed under *The Act respecting Enquiries concerning Public Matters*.

9. This agreement shall extend to, be binding upon, and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

A. BECK, *Chairman*.

(Seal)

W. W. POPE, *Secretary*.

THE POLICE VILLAGE OF ALTON.

WM. WHITE

L. H. LEMON, *Secretary*

SCHEDULE "E."

This agreement made this 6th day of August, A.D. 1918.

Between

The Hydro-Electric Power Commission of Ontario, herein called the "Commission," party of the first part,

and

The Municipal Corporation of the Township of East Flamboro, herein called the "Corporation," party of the second part.

Whereas pursuant to an Act to provide for the transmission of electrical power to municipalities, the Corporation applied to the Commission for a supply of power;

And whereas the Commission has entered into contracts with the Ontario Power Company of Niagara Falls (hereinafter called the Company), for such power;

And whereas the Corporation under the provisions of *The Power Commission Act* and amendments thereto and *The Power Commission Act of 1911* being "An Act to Provide for the Local Distribution of Electrical Power," has, at the request of a number of ratepayers (petitioners) applied to the Commission for a supply of electrical power or energy, and has passed a By-law No. 638 to authorize the execution of an agreement therefor;

1. Now, therefore, this indenture witnesseth:

That in consideration of the premises and of the agreements of the Corporation set forth, subject to the provisions of said Act and amendments and of the said contract, the Commission agrees with the Corporation:

(a) To reserve and deliver at the earliest possible date electrical power to the Corporation as required by the Corporation;

(b) At the expiration of thirty (30) days notice in writing which may be given by the Corporation from time to time during the continuance of this agreement, to reserve and deliver to the Corporation additional electrical power as may be required from time to time;

(c) To use at all times first-class, modern, standard, commercial apparatus and plant, and to exercise due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Corporation;

(d) Power shall be delivered to the Corporation at approximately 2,200 or 4,000 volts, or at any other primary voltage that may be available for the Corporation's use;

(e) To supply and construct all 2,200, 4,000 or other lines at primary voltage made necessary by contracts for electric service made between the Corporation and residents or users, within the Township, from the Commission's transformer station or stations to the service transformers of the Corporation, located at such points as the Commission may approve.

2. In consideration of the premises and of the covenants and agreements herein set forth, the Corporation agrees with the Commission:—

(a) To use all diligence by every lawful means in its power to prepare for the receipt and use of the power dealt with by this agreement, so as to be able to give notice as specified in paragraph 1 (b);

(b) Subject to the provisions of paragraph 2 (g) herein, to pay to the Commission monthly, for all power taken, the cost of the power delivered to the Commission, plus the charges in connection with the delivery of the power to the Municipality as outlined in Clauses 2 (c) and (d);

(c) To pay, annually, in twelve monthly instalments interest upon its proportionate part of the moneys expended by the Commission on capital account for the construction of lines, transformer stations and other necessary works for the delivery of power to the Corporation; to pay an annual sum for its proportionate part of the cost of the said construction, so as to form in thirty years a sinking fund for the retirement of securities issued by the Province of Ontario; and to bear its proportionate part of the line loss and pay its proportionate part of the cost to operate, maintain, repair, renew and insure the said lines, stations and works. All payments under this paragraph shall be subject to adjustment under paragraph 7;

(d) In addition to the cost of power, and the cost of delivering it to the Corporation as provided for in paragraphs 2 (b) and (c), to pay to the Commission in half yearly instalments, interest and sinking fund on a thirty year basis on all capital invested by the Commission in 2,200, 4,000 or other lines of primary voltage as provided for in paragraph 1 (c), and to maintain, repair, renew and operate the said lines, and set aside a depreciation fund at the rate of 5 per cent. per annum on all capital expended by the Commission on such construction;

(e) The amounts payable in accordance with clause 2 (b), (c) and (d) shall be paid in gold coin of the present standard of weight and fineness, at the office of the Commissioner at Toronto, and bills shall be rendered by the Commission on or before the 5th day and paid by the Corporation on or before the 15th day of each month, except that payments under clause 2 (d) shall be made half yearly. If any bill remains unpaid for fifteen days, the Commission may, in addition to all other remedies and without notice, discontinue the supply of power to the Corporation until said bill is paid. No such discontinuance shall relieve the Corporation from the performance of the covenants, provisoes and conditions herein contained. All payments in arrears shall bear interest at the legal rate;

(f) To take power exclusively from the Commission during the continuance of this agreement;

(g) To pay for three-fourths of the power ordered from time to time by the Corporation and held in reserve for it as herein provided whether it takes the same or not. When the highest average amount of power taken for any twenty consecutive minutes during any month shall exceed during the twenty consecutive minutes three-fourths of the amount ordered by the Corporation and held in reserve, then the Corporation shall pay for this greater amount during the entire month.

If the Corporation during any month takes more than the amount of power ordered and held in reserve for it, as determined by an integrated peak, or highest average, for a period of twenty consecutive minutes, the Corporation shall pay for this greater amount of power during the entire month. The taking of such excess shall thereafter constitute an obligation on the part of the Corporation to pay for and on the part of the Commission to hold in reserve an additional block of power in accordance with the terms and conditions of this contract.

When the power factor of the greatest amount of power taken for said twenty consecutive minutes falls below 90 per cent., the Corporation shall pay for 90 per cent. of said power divided by the power factor;

(h) To use at all times first-class, modern, standard, commercial apparatus and plant to be approved by the Commission and to exercise all due skill and diligence so as to secure the most perfect operation of the plant and apparatus of the Commission and of the Company;

(i) To co-operate, by all means in its power, at all times, with the Commission, to increase the quantity of power required from the Commission and in all other respects to carry out the objects of this agreement and of the said Act.

3. If, as therein provided, the said contracts are continued until the 19th day of December, 1939, this agreement shall remain in force until that date.

4. The power shall be three phase, alternating commercially continuous twenty-four hour every day of the year except as provided in paragraph 6, having a periodicity of approximately 25 cycles per second, and shall be delivered as aforesaid at a voltage suitable for distribution within the municipality.

(a) That the meters with their series and potential transformers shall be connected at the point of delivery, and shall be subject to test as to accuracy by either party hereto;

(b) The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery to the Corporation shall constitute the supply of all power involved herein and the fulfilment of all operating obligations hereunder; and when voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases, and all other electrical characteristics and qualities are under the sole control of the Corporation. their agents, customers, apparatus, appliances and circuits.

5. The Engineers of the Commission, or one or more of them, or any other person or persons appointed for this purpose by the Commission, shall have the right from time to time during the continuance of this agreement, to inspect the apparatus, plant and property of the Corporation and take records at all reasonable hours.

6. In case the Commission should at any time or times be prevented from supplying said power, or any part thereof, or in case the Corporation shall at any time be prevented from taking said power, or any part thereof, by strike, lockout, fire, invasion, explosion, act of God, or the King's

enemies or any other cause reasonably beyond their control then the Commission shall not be bound to deliver such power during such times, and the Corporation shall not be bound to pay the price of said power, during such time.

7. The Commission shall at least annually adjust and apportion the amounts payable by municipal corporations for such power and such interest, sinking fund, line loss, and cost of operating, maintaining, repairing, renewing and insuring the line and works.

8. It is hereby declared that the Commission is to be a trustee of all property held by the Commission under this agreement for the Corporation and other municipal corporations supplied by the Commission, but the Commission shall be entitled to a lien upon said property for all moneys expended by the Commission under this agreement and not repaid. At the expiration of this agreement the Commission shall determine and adjust the rights of the Corporation and other municipal corporations, supplied by the Commission, having regard to the amounts paid by them respectively, under the terms of this agreement, and such other considerations, as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

9. If at any time any other municipal corporation or pursuant to said Act, any railway or distributing company, or any other corporation or person, applies to the Commission for a supply of power, the Commission shall notify the applicant and the Corporation in writing, of a time and place and hear all representations that may be made as to the terms and conditions for such supply.

Without discrimination in favour of the applicants as to the price to be paid, for equal quantities of power, the Commission may supply power upon such terms and conditions as may, having regard to the risk and expense incurred, and paid, and to be paid by the Corporation, appear equitable to the Commission, and are approved by the Lieutenant-Governor in Council.

1. In case any municipal corporation, or any person, firm or corporation which shall contract with the Commission or with any municipal corporation for a supply of power furnished to the Commission by the Company shall suffer damages by the act or neglect of the Company, and such municipal corporation, person, firm or corporation would, if the Company had made the said contracts directly with them, have had a right to recover such damages or commence any proceedings or any other remedy, the Commission shall be entitled to commence any such proceedings to bring such action for or on behalf of such municipal corporation, person, firm or corporation, and notwithstanding any act, decision or rule of law to the contrary, the Commission shall be entitled to all the rights and remedies of such municipal corporation, person, firm or corporation, including the right to recover such damages, but no action shall be brought by the Commission until such municipal corporation, person, firm or corporation shall have agreed with the Commission to pay any costs that may be adjudged to be paid if such proceedings or action is unsuccessful. The rights and remedies of any such municipal corporation, person, firm or corporation shall not be hereby prejudiced.

11. If differences arise between corporations to whom the Commission is supplying power, the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties and the Commission shall, in a summary manner when possible, adjust such differences and such adjustment shall be final.

The Commission shall have all the powers that may be conferred upon a Commissioner appointed under *The Act Respecting Enquiries concerning Public Matters*.

12. This agreement shall extend to, be binding upon and enure to the benefit of the successors and assigns of the parties hereto.

In witness whereof the Commission and the Corporation have respectively affixed their corporate seals and the hands of their proper officers.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

A. BECK, *Chairman*.

(Seal.)

W. W. POPE, *Secretary*.

MUNICIPAL CORPORATION OF THE TOWNSHIP OF EAST FLAMBORO.

W. A. EMERY, *Reeve*.

(Seal.)

GEORGE CHURCH, *Clerk*.

NOTE

For Schedules "F," "G," "H," "I" and "J" see Ontario Statutes,
9 Geo. V, 1919, Chap. 16, p. 121.

SCHEDULE "K."

This Indenture made the 10th day of April, one thousand nine hundred and eighteen.

Between

Hydro-Electric Power Commission of Ontario, hereinafter called the "Commission," of the first part;

and

His Majesty the King, represented herein by the Minister of Railways and Canals of Canada, acting under the authority of an Order in Council dated November 19th, 1917, hereinafter called "His Majesty," of the second part.

Whereas, in connection with the construction of the Severn Division of the Trent Canal, a marine railway is being provided at Big Chute, on the Severn River, for the double purpose of making it possible for small boats to pass the Big Chute before the lock is built and, afterwards, avoid the necessity of operating the lock to admit of the passage of such small boats;

And whereas the Commission has offered to supply the power necessary to operate the said marine railway on the terms and conditions hereafter set forth and by said Order in Council of November 19th, 1917, authority has been obtained to accept such offer;

Now, therefore, this indenture witnesseth that the parties hereto hereby covenant, promise and agree, each with the other as follows:

1. That, from and after the first day of May, A.D. 1918, until the cancellation hereof as hereinafter provided, the Commission shall transmit to, furnish and supply His Majesty with all the electrical energy or power necessary for the operation of the said marine railway.

2. That, for and in consideration of the supply of electrical energy or power as aforesaid, His Majesty shall pay to the Commission, monthly, on the written certificate of the chief engineer of the Department of Railways and Canals, at the following rate or rates, namely:

One (\$1.00) dollar per horsepower on the total maximum demand per month, plus a K.W. hour rate of one cent per K.W.H. with a prompt payment discount of 10 per cent. if bill is paid within two weeks after being rendered, the power to be paid for only during the months used, and if used for a portion of any one month the service charge of one dollar per month to be charged on the basis of the whole month.

3. That, for the purpose of measuring the amount of electrical energy or power used, the Commission shall, at its own cost and expense, supply and instal a meter or meters which will satisfactorily indicate the amounts of electrical energy supplied to the marine railway at Big Chute.

4. That the said electrical energy or power shall be supplied continuously, and shall be available for the purposes hereinbefore specified at any and

all times during the twenty-four (24) hours of each and every day of each week, Sunday included, during the months required. The maintenance by the Commission of approximately the agreed voltage at approximately the agreed frequency at the point of delivery shall constitute the supply of power involved herein and a fulfilment of all the operating obligations hereunder, and when the voltage and frequency are so maintained, the amount of power, its fluctuations, load factor, power factor, distribution as to phases, and all other characteristics and qualities are under the sole control of the customer, his agent, apparatus, appliances and circuits. In case the Commission shall at any time or times be prevented from delivering said power or any part thereof, by strikes, lockout, riot, fires, invasion, explosion, act of God, the King's enemies or any other cause or causes reasonably beyond its control, then the Commission shall not be bound to deliver such power during such time. The Commission shall be prompt and diligent in removing the cause of such interruption and as soon as the cause of such interruption is removed, the Commission shall, without any delay, deliver the said power as aforesaid and the customer shall take and use the same.

5. That this indenture may be terminated at any time by either of the parties giving to the other six (6) months' notice, in writing, of its desire and intention to terminate the same.

In witness whereof the Commission has executed these presents, and these presents have been signed on behalf of His Majesty the King by the Minister and by the Secretary of the Department of Railways and Canals, and the seal of the said Department has been hereto affixed the day and year first above written.

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

Signed, sealed and delivered by the Commission
in the presence of

(Sgd.) A. BECK, *Chairman,*
(Sgd.) W. W. POPE, *Secretary.*

(Seal.)

Signed, sealed and delivered by His Majesty, in
manner aforesaid in the presence of

(Sgd.) JOSEPH PROULX.

(Sgd.) J. D. REID,
Minister of Railways and Canals.
(Sgd.) J. W. PUGSLEY,
Secy. Dept. of Railways and Canals.

(Seal.)

NOTE

For Schedules "L," "M" and "N" see Ontario
Statutes, Chap. 16, p. 143

SCHEDULE "O."

Memorandum of agreement, made in triplicate, this 22nd day of May, A.D. 1918;

Between

Essex County Light and Power Company, Limited, hereinafter called the "Vendor," of the first part;

The Hydro-Electric Power Commission of Ontario, hereinafter called the "Purchaser," of the second part;

and

The Detroit Edison Company, of the City of Detroit, in the State of Michigan, one of the United States of America, hereinafter called "The Edison Company," of the third part.

Whereas the Vendor is engaged in the business of producing and distributing in the County of Essex electrical energy for the purpose of light, heat and power and the Vendor has agreed to sell to the Purchaser, the freehold and leasehold lands of the Vendor, together with the plant, machinery, contracts, easements, licenses and agreements hereinafter referred to and its light, heat and power business as aforesaid as a going concern, and

Whereas the Edison Company is the owner of a majority of the capital stock of the Vendor and as such is interested in the making and carrying out of the sale hereinbefore referred to and has undertaken that the Vendor shall carry out the Vendor's obligations hereinafter set forth for the purpose of enabling the Vendor to complete the said sale,

Now this agreement witnesseth as follows:

1. The Vendor shall sell and the Purchaser shall purchase all the property, assets and undertakings of every kind and nature of the Vendor as the same existed on the 31st day of December, 1917, as follows:

(a) The good will of the said business;

(b) All the freehold and leasehold lands, easements and interests in lands owned by the Vendor;

(c) All the plant, machinery, furniture, patents, licenses, stock in trade, stores, goods, chattels, property and effects to which the Vendor is entitled or which are in use by the Vendor or to which the Vendor is entitled in connection with the said business;

(d) The franchises, contracts and engagements of the Vendor, as set out in Schedule "A" hereto attached and forming part of this agreement, all the rights of the Vendor thereunder and the full benefit thereof and all other pending contracts and engagements or existing franchises to which the Vendor is or may be entitled with its said business;

(e) All the other property to which the Vendor is entitled in connection with the said business, except all the Vendor's cash, promissory notes, book accounts and other bills and accounts receivable to which the Vendor is entitled on the 31st (W.W.P.) day of May (W.W.P.), 1918.

2. From the property hereinbefore described the Vendor excepts and reserves the following properties which are not hereby sold or agreed to be sold to the Purchaser, namely:

(a) All the real estate owned by the Vendor in the Town of Sandwich;

(b) The substation and substation equipment located in the Town of Sandwich;

(c) The steam turbine plant and condensor equipment, piping and all other equipment, the property of the Vendor, installed in the plant of the Canadian Salt Company, Limited, at Sandwich, Ontario;

(d) The overhead lines connecting the substation of the Vendor with the Vendor's said equipment installed on the property of the Canadian Salt Company, Limited, in Sandwich, Ontario;

(e) The overhead lines connecting the said substation of the Vendor with the steam plant of the Canadian Salt Company, Limited, in their works in the City of Windsor, but where such overhead lines are carried on 22,000-volt pole lines of the Vendor, only the connecting wires above referred to are excluded from the sale and are to remain the property of the Vendor, the poles and 22,000-volt wires becoming the property of the Purchaser;

(f) The stock of wiring material, electric appliances and supplies of any kind or nature handled by the Vendor in its merchandise business in stock at its various offices on the date hereinafter provided for the completion of the purchase. The intent of this provision is that spare parts for substation or line equipment, or material kept in stock for repairs of lines and substations are to be included in the purchase, but material or supplies intended to be sold to customers and which, therefore, would not become additions to the property, are to be excluded from the said purchase.

3. Part of the consideration for the sale shall be two hundred and twenty-six thousand dollars (\$226,000) and shall be paid and satisfied as follows:

(a) The sum of two hundred thousand dollars (\$200,000) by the delivery to the Vendor of the debentures of the Purchaser guaranteed as hereinafter provided for, of the par value of two hundred thousand dollars (\$200,000), bearing the date hereinafter fixed for completion in denominations of one thousand dollars each, or such denominations being multiples of one hundred dollars (\$100) as the Vendor shall in writing require, payable forty years from the date of issue and bearing interest at the rate of four per cent. (4 per cent.) payable half-yearly;

(b) The sum of twenty-six thousand dollars (\$26,000) by the delivery to the Vendor of the debentures of the Purchaser guaranteed as herein-

after provided for, for the sum of twenty-six thousand dollars (\$26,000) bearing the date hereinafter fixed for completion, in denominations of one thousands dollars (\$1,000) each, or such denominations being multiples of one hundred dollars (\$100) as the Vendor shall in writing require, payable ten years from the date thereof and bearing interest at the rate of five per cent. (5 per cent.) payable half-yearly.

4. All of the debentures referred to in section 3 hereof, shall be payable both as to principal and interest at the chief office of the Bank of Montreal, at Toronto, Ontario, and shall be in the words and figures following:

DOMINION OF CANADA.

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

No.	Essex County Light and Power Issue.	No.
0000	Four per cent. Forty Year Gold Debentures.	0000

The Hydro-Electric Power Commission of Ontario (hereinafter called "The Commission,") for value received hereby promises to pay to the bearer, or if registered to the registered holder hereof, on the first (W.W.P.) day of June (W.W.P.), 1958, on presentation and surrender of this debenture, the sum of one thousand dollars (W.W.P.) . . . at the chief office of the Bank of Montreal in Toronto, Canada, with interest thereon until paid, at the rate of four per centum per annum, payable half-yearly on the first (W.W.P.) day of June (W.W.P.) and the first (W.W.P.) day of December (W.W.P.) in each year, on presentation and surrender of the interest coupons hereto annexed as they severally become due; each payment of principal and interest to be made in gold coin of the Dominion of Canada of the present standard of weight and fineness, or its equivalent.

This debenture shall pass by delivery, but may be registered as to principal in the name of holder in a register which shall be kept by the Commission at its office in Toronto, Canada, in which case it can only be transferred by an instrument in writing, signed by the registered holder or his lawful attorney and registered in the said register. A transfer to bearer may subsequently be registered, after which this debenture shall be transferable by delivery alone until again registered in the name of the holder. Notwithstanding registration, interest coupons shall continue payable to bearer.

This debenture is issued under the authority of an Act of the Legislative Assembly of the Province of Ontario, entitled *The Power Commission Act, 1917*, and being chapter 20 of the Statutes of Ontario (1917), passed in the seventh year of the reign of His Majesty King George V.

In witness whereof, the Commission has caused its corporate seal to be hereunto affixed and this debenture to be signed by its chairman and countersigned by its secretary this first (W.W.P.) day of June (W.W.P.), 1918.

.....
Chairman.

.....
Secretary

And the said debenture shall have attached thereto coupons covering the respective payments of interest, from the date thereof until the maturity of the said debentures, in the words and figures following:

Essex County Light and Power Issue.

The Hydro-Electric Power Commission of Ontario will pay to the bearer on the first (W.W.P.) day of December, 1918, (June), twenty (W.W.P.) dollars, at the chief office of the Bank of Montreal, in Toronto, Canada, such payment to be made in gold coin of the Dominion of Canada, of the present standard of weight and fineness or its equivalent and being the half-yearly interest on debenture No.

Payable on the 1st (W.W.P.) day of June (W.W.P.), 1958. Coupon No.

No.

Dated the 1st (W.W.P.) day of June (W.W.P.), 1918.

(Sgd.) W. W. POPE, *Secretary.*

The signature of the Chairman of the purchaser may be written, lithographed or engraved on each of the said debentures and the signature of the Secretary of the Purchaser may be lithographed, printed or engraved on each of the said coupons and such signatures shall for all purposes be deemed to be the signatures of the Chairman and Secretary.

The Purchaser shall take all necessary legal steps to have the payment of said debentures, both principal and interest, guaranteed by the Province of Ontario, according to law, which guarantee shall be in the words and figures following:

GUARANTEE OF THE PROVINCE OF ONTARIO.

By virtue of powers conferred by the Legislature of the Province of Ontario, Canada, the Province of Ontario hereby guarantees to the holder of the within bond for the time being and to the holder for the time being of any of the coupons.

DOMINION OF CANADA THE HYDRO-ELECTRIC POWER
COMMISSION OF ONTARIO.

No.	Essex County Light and Power Issue.	No.
0000	Five per cent. ten (W.W.P.) Year Gold Debentures.	0000

The Hydro-Electric Power Commission of Ontario (hereinafter called "The Commission") for value received hereby promises to pay to the bearer, or if registered, to the registered holder thereof, on the 1st day of June, 1928, on presentation and surrender of this debenture, the sum of one thousand dollars, at the chief office of the Bank of Montreal, in Toronto, Canada, with interest thereon until paid, at the rate of four per centum per annum, payable half-yearly on the 1st day of June and the 1st day of December in each year, on presentation and surrender of the interest coupon hereto annexed as they severally become due; each payment of principal and interest to be made in gold coin of the Dominion of Canada of the present standard of weight and fineness, or its equivalent.

This debenture shall pass by delivery, but may be registered as to principal in the name of the holder in a register which shall be kept by the Commission at its office in Toronto, Canada, in which case it can only be transferred by an instrument in writing signed by the registered holder or his lawful attorney and registered in the said register. A transfer to bearer may subsequently be registered, after which this debenture shall be transferable by delivery alone until again registered in the name of the holder. Notwithstanding registration, interest coupons shall continue payable to bearer.

This debenture is issued under the authority of an Act of the Legislative Assembly of the Province of Ontario, entitled *The Power Commission Act, 1917*, and being chapter 20 of the Statutes of Ontario (1917), passed in the seventh year of the reign of His Majesty King George V.

In witness whereof, the Commission has caused its Corporate Seal to be hereunto affixed and this debenture to be signed by its Chairman and countersigned by its Secretary this 1st day of June, 1918.

(Signed) A. BECK,
Chairman.

(Signed) W. W. POPE,
Secretary.

And this debenture shall have attached thereto coupons covering the respective payments of interest, from the date thereof until the maturity of the said debenture, in the words and figures following:

Essex County Light and Power Issue.

The Hydro-Electric Power Commission of Ontario. (W.W.P.) will pay to the bearer on the first (W.W.P.) day of June (December) twenty-five (W.W.P.) dollars at the chief office of the Bank of Montreal, in Toronto, Canada, such payment to be made in gold coin of the Dominion of Canada of the present standard of weight and fineness or its equivalent, and being the half-yearly interest on Debenture No.

Payable on the 1st (W.W.P.) day of June, 1928. Coupon No.
Dated the 1st (W.W.P.) day of June, 1918. No.

.....
Secretary.

The signature of the Chairman of the Commission may be written, lithographed or engraved on each of the said debentures and the signature of the Secretary of the Commission may be lithographed, printed or engraved on each of the said coupons and such signatures shall for all purposes be deemed to be the signatures of the Chairman and Secretary.

The Commission shall take all necessary legal steps to have the payment of said debentures, both principal and interest, guaranteed by the Province of Ontario, according to law, which guarantee shall be in the words and figures following:

GUARANTEE OF THE PROVINCE OF ONTARIO.

By virtue of powers conferred by the Legislature of the Province of Ontario, Canada, the Province of Ontario hereby guarantees to the holder of the within bond for the time being and to the holder for the time being of any of the coupons attached thereto, due payment of the principal of the within debenture and of the interest thereon, according to the tenor of the said debenture and of the coupons attached thereto.

.....
Assistant Treasurer of Ontario.

5. The assets and undertakings hereby sold are to be free from all liens, charges or incumbrances but as regards leaseholds subject to the rents and covenants contained in any leases or agreement for leases under which the same are held, and as regards all Municipal Franchises, subject to the obligations therein expressed to be performed or done after the date herein fixed for completion. Should it happen that at the date herein fixed for completion the Vendor is unable to satisfy any liens, charges or incumbrances on the property sold, or any portion thereof, the Vendor agrees that the Purchaser, as a guarantee for the due payment and discharge of such liens, charges or incumbrances, by the Vendor, may retain an amount of the said debentures of the Purchaser equal to (W.W.P.) one hundred and fifty (150) per centum of the principal of said liens, charges or incumbrances, as of the date hereinafter provided for the completion of the purchase, to protect the Purchaser against any loss due to the Vendor not satisfying and discharging any of the said liens, charges or incumbrances as the same become due and payable, together with any interest thereon and any costs, damages or expenses which the Purchaser may be compelled to pay by reasons of the Vendor's default.

6. As the balance of the consideration, the Purchaser shall assume the contracts and agreements of the Vendor in connection with its said business, a list of which is hereto attached as Schedule "A." It being understood, however, that the Purchaser shall assume only such obligations in connection with the said contracts as may be within the power of the Purchaser under *The Power Commission Act of Ontario*, and amendments thereto.

7. The Vendor shall allow the Purchaser the use of the said substation building and equipment therein belonging to the Vendor, located in the Town of Sandwich, Ontario, for one year from the date of completion, or such earlier period of time as the Purchaser requires to change equipment and construct electric transmission lines necessary to supply power to the customers of the Vendor from the electric power supply of the Purchaser. For the use of the said substation and equipment the Purchaser agrees to pay to the Vendor at the rate of fifty dollars (\$50.00) per month, payable monthly, and the Purchaser shall deliver to the said Vendor the said substation and equipment at the expiration of such period of time in as good condition as the said substation and equipment are at the date the Purchaser takes possession of the same under the terms of this agreement, ordinary wear and tear excepted.

8. The Vendor agrees that the Canadian Salt Company, Limited, may operate the steam turbine and auxiliary equipment therewith now in the premises of the Canadian Salt Company, Limited, at Windsor, and also the

electric transmission line connecting the said substation with the steam plant of the Canadian Salt Company, Limited, at Sandwich, Ontario, during the period mentioned in the last preceding section of this agreement, and may thereby supply such quantity of power to the Purchaser as may be required by the Purchaser, for the service of the district now covered by the operations of the Vendor Company in order to enable the Purchaser to carry on during the period limited in the last preceding section and continue the business and operation of the Vendor Company in the district now served by the Vendor Company; it being the intention of the parties hereto that the Purchaser may thereby obtain from the Canadian Salt Company, Limited, such a supply of power as will enable it to continue the Vendor's business as a going concern.

9. In order to enable the Canadian Salt Company, Limited, to generate and supply power as hereinbefore provided, the Vendor shall allow the Canadian Salt Company, Limited, to use the steam turbine and auxiliary equipment therewith, the property of the Vendor, and also the electric transmission line connecting the substation with the steam plant of the Canadian Salt Company, Limited, in Sandwich, Ontario, during the period mentioned in section 7 of this agreement and shall make all necessary arrangements with the Canadian Salt Company, Limited, as to the use of the said steam turbine and auxiliary equipment and transmission line.

10. The Vendor shall also supply to the Canadian Salt Company, Limited, of Windsor, at its plant in the said Town of Sandwich, from time to time, sufficient coal to operate the said steam turbine and auxiliary equipment to produce the necessary power to supply the customers of the Vendor, which are hereby taken over by the Purchaser and to continue the business of supplying light, heat, and power in the district heretofore covered by the operations of the Vendor, during the period limited in section 7 hereof.

11. The Vendor shall transfer, assign, surrender and give up to the Purchaser the franchises and agreements in Schedule "A" hereto referred to, and the full benefit thereof and all rights of whatever nature enjoyed by the Vendor or to which the Vendor may be entitled under any such franchises, agreements and the right to use and occupy the highways or any portion of the same within the limits of the said County of Essex, in the Province of Ontario, and the right to furnish electric light, heat, power and energy to any inhabitant thereof or to any person, firm or corporation within the said limits of the County of Essex, so as to confer upon the Purchaser the full right and authority to carry on the business of supplying electric light, heat, power or energy as fully and effectually as the Vendor has heretofore carried on the said business within the said County of Essex.

12. The purchase shall be completed at the office of the Hydro-Electric Power Commission of Ontario, 190 University Avenue, Toronto, Ontario, on (W.W.P.) Saturday, the first day of June, 1918 (W.W.P.), when possession of the premises shall as far as practicable be given to the Purchaser, and the Vendor shall execute and deliver to the Purchaser due and proper conveyances, transfers and assignments of all the property and rights hereby sold by the Vendor to the Purchaser, and the consideration shall be paid and satisfied save the retention by the Purchaser of such part of the debentures as may be necessary to secure the due discharge of any liens, charges or incumbrances as hereinbefore provided, and thereafter the Vendor and all necessary parties shall at the expense of the Purchaser execute and do all

assurances and things as may be necessary to vest the said premises in the said Purchaser and giving to the Purchaser the full benefit of this agreement as may be reasonably required.

13. And in consideration of the purchase by the Purchaser from the Vendor, as hereinbefore provided, the Edison Company hereby undertakes and agrees that the Vendor shall duly grant, transfer and assign the property, rights and franchises hereby agreed to be sold to the Purchaser and duly and punctually perform all the agreements and obligations hereby undertaken by the Vendor and that in default thereof the Edison Company undertakes to perform and satisfy the same.

14. This agreement shall be binding upon the successors and assigns hereto.

In witness whereof the parties hereto have hereunto caused these presents to be signed by their proper officers in their behalf and their respective corporate seals to be affixed hereto.

ESSEX COUNTY LIGHT AND POWER COMPANY, LIMITED.

Attest:

(Sgd.) A. C. MARSHALL, *Vice-President.*

(Seal.)

(Sgd.) JAMES V. OXFOBY, *Secretary.*

THE HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO.

(Sgd.) A. BECK, *Chairman.*

(Seal.)

(Sgd.) W. W. POPE, *Secretary.*

THE DETROIT EDISON COMPANY.

Attest:

(Sgd.) LEN DOW, *President.*

(Seal.)

(Sgd.) S. C. MUNFORD, *Asst. Secretary.*

SCHEDULE "A."

LIST OF FRANCHISES, AND OTHER AGREEMENTS, TO BE ATTACHED TO AGREEMENT
BETWEEN

Essex County Light & Power Company, Limited,
Hydro-Electric Power Commission of Ontario,

and

The Detroit Edison Company, 1918.

1. Franchise By-law No. 514, of the Township of Anderdon.
2. Franchise By-law No. 955, of the Township of Mersea.
3. Franchise By-law No. 161, of the Township of Colchester, South (the Village of Harrow).
4. Franchise By-law No. 388, of the Township of Colchester, South;
Franchise By-law No. 405, of the Township of Colchester, South, amending
above By-law No. 388.

5. Assignment by James A. Secord to Robert S. Stewart of certain rights in the Village of Harrow.
6. Franchise By-law No. 871, of the Township of Mersea.
7. Franchise By-law No. 186, of the Township of Gosfield, South.
8. Franchise By-law No. 571, of the Township of Colchester, North.
9. Assignment by the Essex Light and Power Co., Ltd., to the Essex County Light & Power Co., Ltd., of all rights and interests in Franchise By-law No. 424, of the Town of Essex.
10. Assignment by the Kingsville Electric Light Company, Ltd., to the Essex County Light & Power Co., Ltd., of its rights and interests in By-law No. 100 of the Town of Kingsville.
11. Assignment by the Amherstburg Electric Light, Heat & Power Co., Ltd., to the Essex County Light & Power Co., Ltd., of its rights and interests in all By-laws passed by the Town of Amherstburg granting to said Amherstburg Electric Light, Heat and Power Co., Ltd., rights and privileges pertaining to the business of operating an electric light system in said town.
12. Franchise By-law No. 420, of the Township of Gosfield, North.
13. Franchise By-law No. 455, of the Township of Sandwich, West.
14. Franchise By-law No. 474, of the Township of Sandwich, West.
15. Assignment of the Leamington Light & Heat Company, Ltd., to the Essex County Light & Power Co., Ltd., of its rights and interests in By-law No. 414, of the Town of Leamington.
16. Franchise By-law No. 414, of the Town of Leamington.
17. Franchise By-law No. 410, of the Town of Sandwich.
18. Agreement with the Town of Sandwich, provided for in above By-law No. 410.
19. Franchise By-law No. 492, of the Township of Malden; By-law No. 505, amending By-law No. 492, together with the agreement accepting by-laws, assignments, etc.
20. Franchise By-law No. 582, covering additional rights in the Township of Anderdon.
21. Agreement with the Bell Telephone Co., of Canada, for joint use of poles in certain places in the Town of Leamington.
22. Letter regarding joint pole line lead with the Windsor, Essex & Lake Shore Railroad.
23. Lease between Essex County Light & Power Company, Ltd., and Lionel H. Robinson, of a piece of land in the Township of Mersea, near the Town of Leamington, to be used for an outdoor substation.
24. Agreement between Essex County Light & Power Co., Ltd., and Annie A. Thomas, covering right-of-way in the Town of Kingsville.
25. Agreement between Leamington Light & Heat Company, Ltd., and Forest Conover, covering right-of-way in the Town of Leamington.
26. Agreement between Kingsville Electric Light Co., Ltd., and Hubert Wigle, covering right-of-way across farm of said Hubert Wigle.
27. Agreement between Leamington Light & Heat Company, Ltd., and H. Curtis, covering right-of-way in Leamington.
28. Agreement between the Kingsville Electric Light Co., Ltd., and Lucinda McLean, covering right-of-way in the Town of Kingsville.
29. Agreement between Kingsville Electric Light Co., Ltd., and W. A. Grenville, covering right-of-way in the Town of Kingsville.
30. Agreement between Kingsville Electric Light Co., Ltd., and Alex. Augustine, for right-of-way across farm of said Alex. Augustine.
31. Agreement between Essex County Light & Power Co., Ltd., and Lucinda Augustine and daughters, covering right-of-way in the Township of Gosfield, South,
(W.W.P.)

NOTE

For Schedules "P," "Q" and "S" see Ontario Statutes,
9 Geo. V, 1919, Chap. 16, p. 168

An Act to amend The Hydro-Electric Railway Act, 1914, and to confirm Certain Contracts and By-laws.

HIS MAJESTY, by and with the advice and consent of the Legislative Assembly of the Province of Ontario, enacts as follows:—

Short title.

1. This Act may be cited as *The Hydro-Electric Railway Act, 1919*.

6 Geo. V,
c. 37, s. 9,
repealed.

2. Section 9 of *The Hydro-Electric Railway Act, 1916*, is repealed.

By-laws
confirmed.

3.—(1) The by-laws the forms of which are respectively set out in Schedule “A” and Schedule “B” to this Act, and which have been heretofore respectively submitted to the vote of the municipal electors of the municipalities named in the schedules to the said by-laws are declared to have been so submitted in due compliance with the provisions of *The Hydro-Electric Railway Act, 1914*, and when finally passed by the council of any of the municipalities named in the contracts appended to each of the said by-laws shall be legal, valid and binding upon the corporation and the ratepayers thereof, anything in any general or special Act of this Legislature to the contrary notwithstanding.

Council to
pass by-law
when
assented
to.

(2) It shall be the duty of the council of every municipality in which either of such by-laws have been approved, or shall hereafter be approved by the electors, to finally pass the by-law and give effect to the same.

Contracts
confirmed.

4.—(1) The contracts set out in Schedule “A” and Schedule “B” to this Act and purporting to be made respectively between the Hydro-Electric Power Commission of Ontario of the First Part, and certain municipal corporations shall be deemed to have been made in pursuance of *The Hydro-Electric Railway Act, 1914*, and to comply with the provisions thereof, and the said contracts shall respectively be legal, valid and binding upon the Commission and upon every municipal corporation a party thereto and executing the same, anything in the said Act or in any other general or special Act of this Legislature to the contrary notwithstanding.

Execution
of contract.

(2) It shall be the duty of the head and the clerk or treasurer of each of the said municipal corporations party to either of the said contracts to sign the contracts, and affix the seal of the corporation thereto forthwith after the passing of the by-law approving of the same, whether the same shall have been so submitted before or after the passing of this Act.

By-laws
confirmed.

5. The by-laws enumerated in Schedule “C” to this Act are confirmed and declared to be legal, valid and binding upon the respective corporations named in Schedule “C” and the ratepayers thereof, anything in any general or special Act relating to any such corporation to the contrary notwithstanding.

6. Schedule "B" to *The Hydro-Electric Railway Act, 1916*, is amended by adding thereto the following: 6 Geo. V.
c. 37,
Sched. "B"
amended.

By-law No. _____, 1916, of the Municipal Corporation of the Township of Blanshard, to authorize a certain agreement made between the Hydro-Electric Power Commission of Ontario and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro Electric Railway Act, 1914*, and amendments thereto. By-law of
Township
of Blanshard
added to
schedule.

7. The by-law referred to in the next preceding section is confirmed and declared to be and to have been from the day of the passing thereof, legal, valid and binding upon the Municipal Corporation of the Township of Blanshard and the ratepayers thereof, anything in any general or special Act relating to any such corporation to the contrary notwithstanding. By-law
confirmed.

8. *The Hydro-Electric Railway Act, 1914*, is amended by adding thereto the following section:— 4 Geo. V,
c. 31,
amended.

17a.—(1) Where a municipal corporation has entered into an agreement with the Commission for the construction and operation of a railway under the provisions of this Act, the corporation shall not enter into any agreement or arrangement with, nor grant any bonus, license or other inducement to any railway or transportation company without the written consent of the Commission, and where any such corporation controls or holds shares or stock in a company operating a railway, an electric railway or street railway, the transfer of the control of such company or of stock or shares therein or securities thereof to any person or corporation shall be deemed to be an agreement or arrangement within the meaning of this section; Municipal
corporation
not to
enter into
certain
agreements
after con-
tract with
Commis-
sion.

(2) Every agreement or arrangement entered into by a municipal corporation in violation of subsection 1 shall be null and void. Agreement
to be
void.

9.—(1) Notwithstanding anything in *The Hydro-Electric Railway Act, 1914*, or any amendments thereto, or in any contract or by-law made or passed, or purporting to be made or passed under the authority of the said Act or the amendments thereto, where any municipal corporation named as a party to any such agreement has failed to pass the necessary by-law and to execute the agreement, and it appears to the Lieutenant-Governor in Council that the amount for which such municipal corporation would be liable under the agreement does not exceed ten per cent. of the estimated cost of the construction and equipment of the railway, and that the remaining municipal corporations parties to the agreement have by resolution of their respective councils, expressed Where
by-law ap-
proving
contract
defeated in
some munici-
palities
and carried
in others.

the desire to proceed with the undertaking notwithstanding the failure of such first-mentioned municipal corporation to execute the agreement, the Lieutenant-Governor in Council may authorize the Commission to proceed with the construction, equipment and operation of the railway provided for in the agreement, and to issue bonds from time to time for the amount required for the undertaking and may authorize the Treasurer of Ontario for and on behalf of the Province to guarantee such bonds as provided in *The Hydro-Electric Railway Act, 1914*, and amendments thereto, and in such case the municipal corporations which have executed the agreement shall deposit with the Commission additional debentures in the respective proportions in which they undertake by the agreement to contribute to the cost of the undertaking, to the amount required to replace the debentures which would have been deposited by the first-mentioned municipal corporation.

Where
by-law
subse-
quently
adopted.

(2) Should any municipal corporation which has so failed to execute the agreement subsequently execute the same and deposit debentures as required by *The Hydro-Electric Railway Act, 1914*, and amendments thereto, the Commission shall return to the municipal corporations the additional debentures deposited under subsection 1, and such debentures may be cancelled by the respective corporations.

Commis-
sion not
bound to
construct
works in
municipality
not ap-
proving.

(3) Until a municipal corporation party to any agreement for the construction and operation of a railway under *The Hydro-Electric Railway Act, 1914*, has executed the agreement and deposited debentures with the Commission as required by the said Act, and the agreement, the Commission shall not be bound to construct, equip, maintain or operate within the limits of the Corporation any works contemplated by the agreement except such as may be necessary for the construction, equipment and maintenance of the railway in passing through the municipality to and from municipalities the corporations of which have executed the agreement and deposited debentures to the amounts stated therein.

Commence-
ment of
Act.

10. This Act shall come into force and take effect upon the day upon which it receives the Royal Assent.

SCHEDULE "A."

PORT CREDIT-ST. CATHARINES SECTION.

By-laws to be Ratified by Legislation.

TOWNSHIP.	DATE PASSED.	BY-LAW No.
Toronto	January 8, 1917	862
Trafalgar	February 5, 1917	138
Nelson	March 31, 1919	659
Flamboro, E.	February 6, 1917	619
Barton	January 22, 1917	1,059
Grimsby, N.	February 10, 1917	234
Clinton	February 5, 1917	296
Louth	February 5, 1917	619
Grantham	February 12, 1917	387
VILLAGES.		
Grimsby	January 11, 1917	417
Beamsville	February 2, 1917	419
TOWNS.		
Oakville	January 24, 1917	542
Burlington	February 2, 1917	320
CITIES.		
Hamilton	April 8, 1919	2,197
St. Catharines	January 22, 1917	3,053

MUNICIPALITY OF THE

OF

By-law No.

A by-law to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario, and the Municipal Corporation of the
of , and other municipal corporations, for the
construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto:

Whereas it is expedient that the Corporation of the
of and other municipal corporations should enter into
an agreement under *The Hydro-Electric Railway Act, 1914*, and amend-
ments thereto, with the Hydro-Electric Power Commission of Ontario, here-
inafter called the Commission, for the construction, equipment and operation
of an electric railway in and through the Municipality of the
of , and certain other municipalities, upon the terms and
conditions and subject to the provisions set forth and contained in the
agreement set out in this by-law, and according to the routes set forth in
Schedule "A" to the said agreement;

And whereas the estimated cost of the work under the said agreement
is \$11,360,363; and whereas the portion of the cost of the construction and
equipment of the line to be borne by the Corporation of the Municipality of
the of is estimated at \$, as set out in
Schedule "B," to the said agreement, subject to adjustments and appor-

tionment between the Corporations by the Commission from time to time, as provided by the said agreement;

And whereas the total amount estimated to be required for the maintenance of the railway, apart from operating expenses, is \$152,193 (the operating revenue being estimated at \$1,362,000, and operation and maintenance at \$722,482);

And whereas the total annual amount estimated to be required, for the period of ten years immediately following the date of the issue of the bonds to be issued under the said agreement, for interest on the said bonds is \$568,018; and thereafter, for the next ensuing forty years, the annual amount estimated to be required for sinking fund charges for the retirement of the said bonds is \$113,604, and for interest on the said bonds, \$568,018;

And whereas the portion to be borne by the Municipality of the of the said annual amounts estimated to be required for maintenance, sinking fund charges and interest is estimated at \$ for the first ten years, as aforesaid, and thereafter at \$ on the same basis as the portion of the cost of construction and equipment, as aforesaid, subject to adjustments and apportionment between the corporations by the Commission from time to time as provided by the said agreement;

And whereas the amount of the whole rateable property of the corporation according to the last revised assessment roll is \$ and the amount of the debenture debt of the corporation is \$, of which neither principal nor interest is in arrear;

And whereas only a portion of the Municipality of the of as enumerated in Schedule "C" to the said agreement, is served by said railway.

Therefore, the Municipal Council of the Corporation of the of enacts as follows:—

1. It shall be lawful for the Corporation of the of , and the said Corporation is hereby authorized to enter into the following agreement with the Hydro-Electric Power Corporation of Ontario and other corporations, the said agreement being hereby incorporated into and forming a part of this by-law, and the and clerk of the corporation are hereby authorized and directed to execute the said agreement upon behalf of this Corporation and to attach the seal of the Corporation thereto.

2. Only those duly qualified electors residing in the of in the district enumerated in Schedule "C" of said agreement shall be entitled to vote on the by-law, and any rate required to be levied for payment of debentures or interest thereon shall be raised, levied and collected from the rateable property in such district only.

AGREEMENT HEREINBEFORE REFERRED TO.

This indenture made the day of in the year of our Lord, one thousand nine hundred and ,

Between

The Hydro-Electric Power Commission of Ontario (hereinafter called the "Commission") of the first part;

and

The Municipal Corporations of the Township of Toronto, the Township of Trafalgar, the Township of Neison, the Township of East Flamboro, the Township of West Flamboro, the Township of Barton, the Township of Saltfleet, the Township of North Grimsby, the Township of Clinton, the Township of Louth, the Township of Grantham, the Village of Grimsby, the Village of Beamsville, the Town of Oakville, the Town of Burlington, the City of Hamilton and the City of St. Catharines.

Whereas, pursuant to *The Hydro-Electric Railway Act, 1914*, and amendments thereto the Commission was requested to enquire into, examine, investigate and report upon the cost of construction and operation of an electric railway or railways to be constructed through certain districts in which the corporations are situated, together with the probable revenue that would result from the operation of such railway or railways;

And whereas the Commission has furnished the corporations with such a report showing (1) the total estimated cost, operating revenue and expenses of the railway or railways, and (2) the proportion of the capital cost to be borne by each of the corporations as set forth in Schedule "B" attached hereto;

And whereas on receipt of the said report the Corporation requested the Commission to construct, equip and operate a system of electric railways (hereinafter called the railway) over the routes laid down in Schedule "A" attached hereto, upon the terms and conditions and in the manner herein set forth;

And whereas the Commission has agreed with the corporations on behalf of the corporations to construct, equip and operate the railway upon the terms and conditions and in the manner herein set forth; but upon the express conditions that the Commission shall not in any way be liable by reason of any error or omission in any estimates, plans or specifications for any financial or other obligation or loss whatsoever by virtue of this agreement or arising out of the performance of the terms thereof;

And whereas the electors of each of the corporations have assented to by-laws authorizing the corporations to enter into this agreement with the Commission for the construction, equipment and operation of the railway as laid down in the said schedules, subject to the following terms and conditions;

And whereas the corporations have each issued debentures for the amounts set forth in Schedule "B" attached hereto, and have deposited the said debentures with the Commission;

Now, therefore, this indenture witnesseth:—

1. In consideration of the premises and of the agreements of the corporations herein contained, and subject to the provisions of the said Act

and amendments thereto, the Commission agrees with the corporations respectively:—

(a) To construct, equip and operate the railway through the districts in which the corporations are situate on behalf of the corporations;

(b) To construct and operate the railway over the routes laid down in Schedule "A";

(c) To issue bonds, as provided in paragraph 3 of this agreement, to cover the cost of constructing and equipping the railway;

(d) To furnish as far as possible first-class, modern and standard equipment for use on the railway, to operate this equipment so as to give the best service and accommodation possible, having regard to the district served, the type of construction and equipment adopted and all other equitable conditions, and to exercise all due skill and diligence so as to secure the most effective operation and service of the railway consistent with good management;

(e) To regulate and fix the fares and rates of toll to be collected by the railway for all classes of service;

(f) To utilize the routes and property of the railway for all purposes from which it is possible to obtain a profit;

(g) To combine the property and works of the railway and the power lines of the Commission where such combination is feasible and may prove economical to both the railway and the users of the power lines;

(h) To permit and obtain interchange of traffic with other railways wherever possible and profitable;

(i) To supply electrical power or energy for operation of the railway at rates consistent with those charged to municipal corporations;

(j) To apportion annually the capital costs and operating expenses of all works, apparatus and plant used by the railway in common with the Commission's transmission lines in a fair manner, having regard to the service furnished by the expenditure under consideration;

(k) To apply the revenue derived from operation of the railway and any other revenue derived from the undertaking to the payment of operating expenses (including electrical power), the cost of administration, and annual charges for interest and sinking fund on the money invested, and such other deductions as are herein provided for;

(l) To set aside from any revenue thereafter remaining an annual sum for the renewal of any works belonging in whole or in part to the undertaking;

(m) To pay over annually to the corporations, if deemed advisable by the Commission in the interests of the undertaking, any surplus that may remain after providing for the items above mentioned. The division of such surplus between the corporations to be fixed by the Commission on

an equitable basis, having regard in the case of each corporation to the capital invested, the service rendered, the comparative benefits derived, and all other like conditions;

(n) To take active steps for the purpose of constructing, equipping and operating the railway at the earliest possible date after the execution of this agreement by the corporations and the deposit of the debentures as called for under clause 2 (b) hereof and to commence operation of each section as soon as possible after its completion;

(o) To make such extensions to the railway described in Schedule "A" as may appear advantageous and profitable from time to time.

2. In consideration of the premises and of the agreements herein set forth, each of the corporations for itself, and not one for the other, agrees with the Commission:—

(a) To bear its share of the cost of constructing, equipping, operating, maintaining, repairing, renewing and insuring the railway and its property and works as established by the Commission, subject to adjustments and apportionment between the corporations by the Commission from time to time;

(b) To issue debentures for the amounts set forth in Schedule "B" maturing in fifty years from the date of issue thereof, and payable yearly at the Bank, at Toronto, Ontario. Such debentures shall be deposited with the Commission previous to the issuing of the bonds mentioned above, and may be held or disposed of from time to time by the Commission, as provided for in clause 4 hereof, in such amounts, at such rates of discount or premium, and on such terms and conditions as the Commission in its sole discretion shall deem to be in the interests of the railway, the proceeds of such debentures being used solely for the purposes herein contained. The amount of debentures of each corporation sold or disposed of from time to time shall be such proportion as may be fixed by the Commission of the total amount of debentures, due regard being given to the capital invested, the service rendered, the comparative revenue derived, and all other equitable conditions;

(c) To make no agreement or arrangement with, and to grant no bonus, license or other inducement to any other railway or transportation company without the written consent of the Commission;

(d) To keep, observe and perform the covenants, provisos and conditions set forth in this agreement intended to be kept and observed and performed by the corporations, and to execute such further or other documents and to pass such by-laws as may be requested by the Commission for the purpose of fully effectuating the objects and intent of this agreement;

(e) To furnish a free right-of-way for the railway and for the power lines of the Commission over any property of the corporations upon being so requested by the Commission, and to execute such conveyance thereof or agreement with regard thereto as may be desired by the Commission.

3. It shall be lawful and the Commission is hereby authorized to create or cause to be created an issue of bonds, and to sell or dispose of the same

on behalf of the corporations. Such bonds to be charged upon and secured by the railway, and all the assets, rights, privileges, revenues, works, property and effects belonging thereto or held or used in connection with the railway constructed, acquired, operated and maintained by the Commission under this agreement, and to be for the total amounts mentioned in Schedule "B" hereto attached; provided that the Commission may, upon obtaining the consent as herein defined of the majority of the corporations, increase the said bond issue by any amount necessary to cover the capital cost of extending the railway, and may also without such consent increase the said bond issue to cover the cost of additional works or equipment of any kind for use on the railway to an extent not exceeding ten per cent. (10%) of the bonds issued from time to time. In order to meet and pay such bonds and interest as the same become due and payable the Commission shall in each year after the expiration of ten years from the date of the issue of the bonds out of the revenue of the railway after payments of operating expenses (including electrical power) and the cost of administration, set aside a sufficient sum to provide a sinking fund for the purpose of redeeming the same at maturity. Debentures issued by the corporations in compliance with clause 2 (b) hereof, shall, to the extent of the par value of any bonds outstanding from time to time, be held or disposed of by the Commission in trust for the holders of such bonds as collateral security for payment thereof, it being understood and agreed that in the event of any increase of the said bond issue each corporation shall, upon the request of the Commission deposit with the Commission additional debentures as described in clause 2 (b) hereof, to be held or disposed of by the Commission as collateral security for such increase of the said bond issue, and that any debentures held by the Commission in excess of the par value of the outstanding bonds from time to time may be held or disposed of by the Commission to secure payment of any deficit arising from the operation of the railway.

4. In the event of the revenue derived from the operation of the undertaking being insufficient in any year to meet the operating expenses (including electrical power), the cost of administration and the annual charges for interest and sinking fund on the bonds, and for the renewal of any works belonging in whole or in part to the railway, such deficit shall be paid to the Commission by the corporations upon demand of and in the proportion adjusted by the Commission. In the event of the failure of any corporation to pay its share of such a deficit as adjusted by the Commission, it shall be lawful for the Commission in the manner provided in clause 2 (b) to dispose of debentures held by the Commission as security for any such deficit. Any arrears by any corporation shall bear interest at the legal rate.

5. Should any corporation fail to perform any of the obligations to the Commission under this agreement, the Commission may, in addition to all other remedies and without notice, discontinue the service of the railway to such corporation in default until the said obligation has been fulfilled, and no such discontinuance of service shall relieve the corporation in default from the performance of the covenants, provisoes and conditions herein contained.

6. In case the Commission shall at any time or times be prevented from operating the railway or any part thereof by strike, lockout, riot, fire; invasion, explosion, act of God, or the King's enemies, or any other cause

reasonably beyond its control, then the Commission shall not be bound to operate the railway or such part thereof during such time; but the corporations shall not be relieved from any liability or payment under this agreement, and as soon as the cause of such interruption is removed the Commission shall, without any delay, continue full operation of the railway, and each of the corporations shall be prompt and diligent in doing everything in its power to remove and overcome any such cause or causes of interruption.

7. It shall be lawful for, and the corporations hereby authorize the Commission to unite the business of the railway with that of any other railway system operated in whole or in part by the Commission, and to exchange equipment and operators from one system to the other, proper provision being made so that each system shall pay its proportionate share of the cost of any equipment used in common.

8. If at any time any other municipal corporation applies to the Commission for an extension of the railway into its municipality the Commission shall notify the applicant and the corporations, in writing, of a time and place to hear all representations that may be made as to the terms and conditions relating to such proposed extension. If, on the recommendation of the Commission, such extension shall be authorized, without discrimination in favour of the applicant, as to the cost incurred or to be incurred for or by reason of any such extension, the Commission may extend the railway upon such terms and conditions as may appear equitable to the Commission.

No such application for an extension of the railway into any municipality the corporation of which is not a party to this agreement shall be granted if it is estimated by the Commission that the cost or service of the railway to the corporations parties hereto will be thereby increased or the revenue and accommodation be injuriously affected without the written consent of the majority of the corporations parties hereto.

9. The consent of any corporation required under this agreement shall mean the consent of the council of such corporations, such consent being in the form of a municipal by-law duly passed by the council of the corporation.

10. The Commission shall at least annually, adjust and apportion between the corporations the cost of construction, equipment, operation, interest, sinking fund, and also the cost of renewing the property of the railway.

11. Every railway and all the works, property and effects held and used in connection therewith, constructed, acquired, operated and maintained by the Commission under this agreement and the said Act shall be vested in the Commission on behalf of the corporations; but the Commission shall be entitled to a lien upon the same for all money expended by the Commission under this agreement and not repaid.

12. Each of the corporations covenants and agrees with the other:—

(a) To carry out the agreements and provisions herein contained;

(b) To co-operate by all means in its power at all times with the Com-

mission to create the most favourable conditions for the carrying out of the objects of this agreement and of the said Act, and to increase the revenue of the railway and ensure its success.

13. In the event of any difference between the corporations the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties, and the Commission shall adjust such differences, and such adjustments shall be final. The Commission shall have all the powers that may be conferred upon a commissioner appointed under the *Act Respecting Enquiries Concerning Public Matters*.

14. This agreement shall continue and extend for a period of fifty years from the date hereof, and at the expiration thereof be subject to renewal, with the consent of the corporations from time to time for like periods of fifty years, subject to adjustment and re-apportionment as herein provided for the purposes of this agreement as though the terms hereof had not expired. At the expiration of this agreement the Commission shall determine and adjust the rights of the corporations, having regard to the amounts paid or assumed by them respectively under the terms of this agreement, and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

15. It is understood and agreed that the rates imposed for the share of the cost to be borne by those municipalities listed in Schedule "C" attached hereto, shall be imposed upon the rateable property set forth respectively in the said schedule.

16. This agreement shall not come into effect until it has been sanctioned by the Lieutenant-Governor in Council.

In witness whereof the Commission and the Corporations have respectively affixed their corporate seals and the hands of their proper officers.

SCHEDULE "A."

ROUTES

Port Credit—Hamilton Section:

From a point approximately one mile west of the Village of Port Credit on the projected Toronto-London line it is proposed to parallel the Grand Trunk Railway to a point near Clarkson, thence in a south-westerly direction across the Toronto-Hamilton highway to the middle of concession 3, thence through the centre of the same concession to the Town of Oakville, at which point the Oakville Creek will be crossed in the neighbourhood of Sheddon Avenue. From Oakville the line will strike straight for the Hamilton Radial crossing of the Bronte Creek, from which point it is proposed to parallel the Hamilton Radial to Burlington. Through Burlington the line will cross through the town in the neighbourhood of Wellington Avenue and thence direct to a crossing of the old Des Jardins Canal at Valley Inn.

Hamilton City Section:

Through the City of Hamilton it is proposed to parallel the main line of the Grand Trunk on the west side between the railway and the existing highway. Through Harvey Park and Dundurn Park the line will be south of and as close to the Grand Trunk as possible, and will continue easterly, crossing Barton south side of Barton Street to the corner of Tiffany Street, where it will cross Barton and continue in a north-easterly direction across

Bay, Park, Murray and McNab Streets, and James Street between Murray and Stuart Streets; thence in the same general direction across Hughson Mary, Catharine, Ferguson and Wellington Streets, at which latter point it turns and follows south of Ferrie Street, across Victoria and Emerald to a point just north of the T.H. & B. Railway spur, which it parallels on the north side to Sherman Avenue. From Sherman Avenue the line bears north-easterly to the south side of the Hamilton and North-Western Railway, which it parallels to the city limits.

Hamilton-St. Catharines Section:

From a point on Kenilworth Avenue of the City of Hamilton, just south of the Hamilton and North-Western Railway, the line turns and bears south-easterly to a point midway between the Grand Trunk Railway station of Stoney Creek and the village of the same name, thence to a point about one-quarter of a mile north of Fruitland, thence at about the same distance north of the Hamilton Stone Road as far as Winona, from which point it will parallel the Grand Trunk on the south side through the Village of Grimsby and as far east as the Grimsby and Clinton town line. From this latter point the line will bear south-easterly to the Village of Beamsville, to a point just north of the Hamilton Stone Road, and thence paralleling same to Jordan Village. From Jordan to the town line between Louth and Grantham it is proposed to follow in the neighbourhood of the road allowance between concessions 4 and 5; thence parallel to the road allowance between concessions 6 and 7 of the Township of Grantham, to a point where it crosses the Grand Trunk Railway; thence south-easterly to a point near Victoria and Permilla Streets; thence along Permilla Street to the west end of the new bridge over the old Welland Canal.

SCHEDULE "B."

Name of Municipal Corporation.	Total amount of debentures to be issued by respective municipalities for deposit with the Commission under Clause 2 (b).
Township of Toronto	\$243,087
Township of Trafalgar	538,735
Township of Nelson	374,812
Township of East Flamboro	266,626
Township of West Flamboro	66,669
Township of Barton	284,484
Township of Saltfleet	1,002,296
Township of North Grimsby	424,077
Township of Clinton	473,746
Township of Louth	563,595
Township of Grantham	128,280
Village of Grimsby	101,817
Village of Beamsville	51,469
Town of Oakville	203,098
Town of Burlington	144,536
City of Hamilton	5,869,286
City of St. Catharines	623,750

Total amount of bonds to be issued mentioned in

Clause 3\$11,360,363

SCHEDULE "C."

Name of Municipal Corporation:	Districts, rateable property of which shall bear rate levied against the Corporation:
Made, passed and entered this	day , 191 .
	..... Reeve (Mayor).
	..... Clerk.

SCHEDULE "B."

WELLAND, PORT COLBORNE, BRIDGEBURG RADIAL BY-LAWS TO BE RATIFIED BY LEGISLATION.

<i>Townships.</i>	<i>Date Passed.</i>	<i>By-law No.</i>
Humberstone	February 5, 1917	474
Crowland		14 of 1916
Bertie	January 8, 1917	882
<i>Villages.</i>		
Port Colborne	January 22, 1917	9 of 1916
Fort Erie	January 8, 1917	479
Humberstone	January 15, 1917	58
<i>Towns.</i>		
Welland	January 8, 1917	928
Bridgburg	February 5, 1917	348

MUNICIPALITY OF THE OF

By-law No.

A by-law to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the of , and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto:

Whereas it is expedient that the Corporation of the of and other municipal corporations should enter into an agreement under *The Hydro-Electric Railway Act, 1914*, and amendments thereto, with the Hydro-Electric Power Commission of Ontario, hereinafter called the Commission, for the construction, equipment and operation of an electric railway in and through the Municipality of the of and certain other municipalities, upon the terms and conditions and subject to the provisions set forth and contained in the agreement set out in this by-law, and according to the routes set forth in Schedule "A" to the said agreement;

And whereas the estimated cost of the work under the said agreement is \$2,208,716, and whereas the portion of the cost of the construction and equipment of the line to be borne by the corporation of the Municipality of the of is estimated at \$, as set out in Schedule "B" to the said agreement, subject to adjustments and apportionment between the corporations by the Commission from time to time, as provided by the said agreement;

And whereas the total amount estimated to be required for the maintenance of the railway, apart from operating expenses, is \$44,351 (the operating revenue being estimated at \$333,000, and operation and maintenance at \$204,565);

And whereas the total annual amount estimated to be required, for the period of ten years immediately following the date of the issue of the bonds to be issued under the said agreement, for interest on the said bonds is \$110,435, and thereafter, for the next ensuing forty years, the annual amount estimated to be required for sinking fund charges for the retirement of the said bonds is \$22,087, and for interest on the said bonds, \$110,435,

And whereas the portion to be borne by the Municipality of the of of the said annual amounts estimated to be required for maintenance, sinking fund charges and interest is estimated at \$ for the first ten years, as aforesaid, and thereafter at \$ on the same basis as the portion of the cost of construction and equipment, as aforesaid, subject to adjustments and apportionment between the corporations by the Commission from time to time as provided by the said agreement;

And whereas the amount of the whole rateable property of the corporation according to the last revised assessment roll is \$, and the amount of the debenture debt of the corporation is \$, of which neither principal nor interest is in arrear;

And whereas only a portion of the Municipality of the of as enumerated in Schedule "C" to the said agreement, is served by said railway;

Therefore, the Municipal Council of the Corporation of the of enacts as follows:—

1. It shall be lawful for the Corporation of the of and the said corporation is hereby authorized to enter into the following agreement with the Hydro-Electric Power Commission of Ontario and other corporations, the said agreement being hereby incorporated into and forming a part of this by-law, and the and clerk of the corporation are hereby authorized and directed to execute the said agreement upon behalf of this corporation and to attach the seal of the corporation thereto.

2. Only those duly qualified property owners in the of in the district enumerated in Schedule "C" of said agreement shall be entitled to vote on the by-law, and any rate required to be levied for payment of debentures or interest thereon shall be raised, levied and collected from the rateable property in such district only.

AGREEMENT HEREINBEFORE REFERRED TO.

This indenture made the day of in the year of our Lord, one thousand nine hundred and

Between

The Hydro-Electric Power Commission of Ontario (hereinafter called the "Commission") of the first part,

and

The Municipal Corporations of the Township of Crowland, the Township of Humberstone, the Township of Bertie, the Village of Humber-

stone, the Village of Port Colborne, the Village of Fort Erie, the Town of Welland, and the Town of Bridgeburg (hereinafter called the "Corporations") of the second part.

Whereas pursuant to the *Hydro-Electric Railway Act, 1914*, and amendments thereto the Commission was requested to enquire into, examine, investigate and report upon the cost of construction and operation of an electric railway or railways to be constructed through certain districts in which the corporations are situated, together with the probable revenue that would result from the operation of such railway or railways;

And whereas the Commission has furnished the corporations with such a report showing (1) the total estimated cost, operating revenue and expenses of the railway or railways, and (2) the proportion of the capital cost to be borne by each of the corporations as set forth in Schedule "B" attached hereto;

And whereas on receipt of the said report the corporation requested the Commission to construct, equip and operate a system of electric railways (hereinafter called the railway) over the routes laid down in Schedule "A" attached hereto, upon the terms and conditions and in the manner herein set forth;

And whereas the Commission has agreed with the corporations on behalf of the corporations to construct, equip and operate the railway upon the terms and conditions and in the manner herein set forth; but upon the express conditions that the Commission shall not in any way be liable by reason of any error or omission in any estimates, plans or specifications for any financial or other obligation or loss whatsoever by virtue of this agreement or arising out of the performance of the terms thereof;

And whereas the electors of each of the corporations have assented to by-laws authorizing the corporations to enter into this agreement with the Commission for the construction, equipment and operation of the railway as laid down in the said schedules, subject to the following terms and conditions;

And whereas the corporations have each issued debentures for the amounts set forth in Schedule "B" attached hereto, and have deposited the said debentures with the Commission;

Now, therefore, this indenture witnesseth:—

1. In consideration of the premises and of the agreements of the corporations herein contained, and subject to the provisions of the said Act and amendments thereto, the Commission agrees with the corporations respectively:—

(a) To construct, equip and operate the railway through the districts in which the corporations are situate on behalf of the corporations;

(b) To construct and operate the railway over the routes laid down in Schedule "A";

(c) To issue bonds, as provided in paragraph 3 of this agreement, to cover the cost of constructing and equipping the railway;

(d) To furnish as far as possible first-class, modern and standard equipment for use on the railway, to operate this equipment so as to give the best service and accommodation possible, having regard to the district served, the type of construction and equipment adopted and all other equitable conditions, and to exercise all due skill and diligence so as to secure the most effective operation and service of the railway consistent with good management;

(e) To regulate and fix the fares and rates of toll to be collected by the railway for all classes of service;

(f) To utilize the routes and property of the railway for all purposes from which it is possible to obtain a profit;

(g) To combine the property and works of the railway and the power lines of the Commission where such combination is feasible and may prove economical to both the railway and the users of the power lines;

(h) To permit and obtain interchange of traffic with other railways wherever possible and profitable;

(i) To supply electrical power or energy for operation of the railway at rates consistent with those charged to municipal corporations;

(j) To apportion annually the capital costs and operating expenses of all works, apparatus and plant used by the railway in common with the Commission's transmission lines in a fair manner, having regard to the service furnished by the expenditure under consideration;

(k) To apply the revenue derived from operation of the railway and any other revenue derived from the undertaking to the payment of operating expenses (including electrical power), the cost of administration, and annual charges for interest and sinking fund on the money invested, and such other deductions as are herein provided for;

(l) To set aside from any revenue thereafter remaining an annual sum for the renewal of any works belonging in whole or in part to the undertaking;

(m) To pay over annually to the corporations, if deemed advisable by the Commission in the interests of the undertaking, any surplus that may remain after providing for the items above mentioned. The division of such surplus between the corporations to be fixed by the Commission on an equitable basis, having regard in the case of each corporation to the capital invested, the service rendered, the comparative benefits derived, and all other like conditions;

(n) To take active steps for the purpose of constructing, equipping and operating the railway at the earliest possible date after the execution of this agreement by the corporations and the deposit of the debentures as called for under clause 2 (b) hereof and to commence operation of each section as soon as possible after its completion;

(o) To make such extensions to the railway described in Schedule "A" as may appear advantageous and profitable from time to time.

2. In consideration of the premises and of the agreements herein set forth, each of the corporations for itself, and not one for the other, agrees with the Commission:—

(a) To bear its share of the cost of constructing, equipping, operating, maintaining, repairing, renewing and insuring the railway and its property and works as established by the Commission, subject to adjustments and apportionment between the corporations by the Commission from time to time;

(b) To issue debentures for the amounts set forth in Schedule "B" maturing in fifty years from the date of issue thereof, and payable yearly at the Bank, at Toronto, Ontario. Such debentures shall be deposited with the Commission previous to the issuing of the bonds mentioned above, and may be held or disposed of from time to time by the Commission, as provided for in clause 4 hereof in such amounts, at such rates of discount or premium, and on such terms and conditions as the Commission in its sole discretion shall deem to be in the interests of the railway, the proceeds of such debentures being used solely for the purposes herein contained. The amount of debentures of each corporation sold or disposed of from time to time shall be such proportion as may be fixed by the Commission of the total amount of debentures, due regard being given to the capital invested, the service rendered, the comparative revenue derived, and all other equitable conditions;

(c) To make no agreement or arrangement with, and to grant no bonus, license or other inducement to any other railway or transportation company without the written consent of the Commission;

(d) To keep, observe and perform the covenants, provisoes and conditions set forth in this agreement intended to be kept and observed and performed by the corporations, and to execute such further or other documents and to pass such by-laws as may be requested by the Commission for the purpose of fully effectuating the objects and intent of this agreement;

(e) To furnish a free right of way for the railway and for the power lines of the Commission over any property of the corporations upon being so requested by the Commission, and to execute such conveyance thereof or agreement with regard thereto as may be desired by the Commission.

3. It shall be lawful and the Commission is hereby authorized to create or cause to be created an issue of bonds, and to sell or dispose of the same on behalf of the corporations. Such bonds to be charged upon and secured by the railway, and all the assets, rights, privileges, revenues, works, property and effects belonging thereto or held or used in connection with the railway constructed, acquired, operated and maintained by the Commission under this agreement, and to be for the total amounts mentioned in Schedule "B" hereto attached; provided that the Commission may, upon obtaining the consent as herein defined of the majority of the corporations, increase the said bond issue by any amount necessary to cover the capital cost of extending the railway, and may also without such consent increase the said bond issue to cover the cost of additional works or equipment of any kind for use on the railway to an extent not exceeding ten per cent. (10%) of the bonds issued from time to time. In order to meet and pay such bonds and interest as the same become due and payable

the Commission shall in each year after the expiration of ten years from the date of the issue of the bonds out of the revenue of the railway after payments of operating expenses (including electrical power) and the cost of administration set aside a sufficient sum to provide a sinking fund for the purpose of redeeming the same at maturity. Debentures issued by the corporations in compliance with clause 2 (b) hereof, shall, to the extent of the par value of any bonds outstanding from time to time, be held or disposed of by the Commission in trust for the holders of such bonds as collateral security for payment thereof, it being understood and agreed that in the event of any increase of the said bond issue each corporation shall, upon the request of the Commission, deposit with the Commission additional debentures as described in clause 2 (b) hereof, to be held or disposed of by the Commission as collateral security for such increase of the said bond issue, and that any debentures held by the Commission in excess of the par value of the outstanding bonds from time to time may be held or disposed of by the Commission to secure payment of any deficit arising from the operation of the railway.

4. In the event of the revenue derived from the operation of the undertaking being insufficient in any year to meet the operating expenses (including electrical power), the cost of administration and the annual charges for interest and sinking fund on the bonds, and for the renewal of any works belonging in whole or in part to the railway, such deficit shall be paid to the Commission by the corporations upon demand of and in the proportion adjusted by the Commission. In the event of the failure of any corporation to pay its share of such a deficit as adjusted by the Commission, it shall be lawful for the Commission in the manner provided in clause 2 (b) to dispose of debentures held by the Commission as security for any such deficit. Any arrears by any corporation shall bear interest at the legal rate.

5. Should any corporation fail to perform any of the obligations to the Commission under this agreement, the Commission may, in addition to all other remedies and without notice, discontinue the service of the railway to such corporation in default until the said obligation has been fulfilled, and no such discontinuance of service shall relieve the corporation in default from the performance of the covenants, provisos and conditions herein contained.

6. In case the Commission shall at any time or times be prevented from operating the railway or any part thereof by strike, lockout, riot, fire, invasion, explosion, act of God, or the King's enemies, or any other cause reasonably beyond its control, then the Commission shall not be bound to operate the railway or such part thereof during such time; but the corporations shall not be relieved from any liability or payment under this agreement, and as soon as the cause of such interruption is removed the Commission shall, without any delay, continue full operation of the railway, and each of the corporations shall be prompt and diligent in doing everything in its power to remove and overcome any such cause or causes of interruption.

7. It shall be lawful for, and the corporations hereby authorize the Commission to unite the business of the railway with that of any other railway system operated in whole or in part by the Commission, and to exchange equipment and operators from one system to the other, proper

provision being made so that each system shall pay its proportionate share of the cost of any equipment used in common.

8. If at any time any other municipal corporation applies to the Commission for an extension of the railway into its municipality the Commission shall notify the applicant and the corporations, in writing, of a time and place to hear all representations that may be made as to the terms and conditions relating to such proposed extension. If, on the recommendation of the Commission, such extension shall be authorized, without discrimination in favour of the applicant, as to the cost incurred or to be incurred for or by reason of any such extension, the Commission may extend the railway upon such terms and conditions as may appear equitable to the Commission.

No such application for an extension of the railway into any municipality the corporation of which is not a party to this agreement shall be granted if it is estimated by the Commission that the cost of service of the railway to the corporations parties hereto will be thereby increased or the revenue and accommodation be injuriously affected without the written consent of the majority of the corporations parties hereto.

9. The consent of any corporation required under this agreement shall mean the consent of the council of such corporations, such consent being in the form of a municipal by-law duly passed by the council of the corporation.

10. The Commission shall, at least annually, adjust and apportion between the corporations the cost of construction, equipment, operation, interest, sinking fund, and also the cost of renewing the property of the railway.

11. Every railway and all the works, property and effects held and used in connection therewith, constructed, acquired, operated and maintained by the Commission under this agreement and the said Act shall be vested in the Commission on behalf of the corporations; but the Commission shall be entitled to a lien upon the same for all moneys expended by the Commission under this agreement and not repaid.

12. Each of the corporations covenants and agrees with the other;

(a) To carry out the agreements and provisions herein contained:

(b) To co-operate by all means in its power at all times with the Commission to create the most favourable conditions for the carrying out of the objects of this agreement and of the said Act, and to increase the revenue of the railway and ensure its success.

13. In the event of any difference between the corporations the Commission may, upon application, fix a time and place to hear all representations that may be made by the parties, and the Commission shall adjust such differences, and such adjustments shall be final. The Commission shall have all the powers that may be conferred upon a commissioner appointed under the *Act respecting Enquiries Concerning Public Matters*.

14. This agreement shall continue and extend for a period of fifty years from the date hereof, and at the expiration thereof be subject to renewal, with the consent of the corporations from time to time for like periods of

fifty years, subject to adjustment and re-apportionment as herein provided for the purposes of this agreement as though the terms hereof had not expired. At the expiration of this agreement the Commission shall determine and adjust the rights of the corporations, having regard to the amounts paid or assumed by them respectively under the terms of this agreement, and such other considerations as may appear equitable to the Commission and are approved by the Lieutenant-Governor in Council.

15. It is understood and agreed that the rates imposed for the share of the cost to be borne by those municipalities listed in Schedule "C" attached hereto, shall be imposed upon the rateable property set forth respectively in the said schedule.

16. This agreement shall not come into effect until it has been sanctioned by the Lieutenant-Governor in Council.

In witness whereof the Commission and the corporations have respectively affixed their corporate seals and the hands of their proper officers.

SCHEDULE "A."

ROUTES.

WELLAND, PORT COLBORNE TO BRIDGEBURG.

From East Main Street in Welland it is proposed to run southward over South Main Street, thence to a point east of the Welland Canal at the Michigan Central Railroad bridge, thence along the east bank of the Welland Canal through Humberstone and Port Colborne.

From Port Colborne eastward it is proposed to run midway between the Grand Trunk Railway and Lake Erie, as far as a point south of Sherks, thence in south-easterly direction to the northern limits of Crystal Beach, thence to a point on the south side of the Grand Trunk Railway, a short distance east of Ridgeway, thence following the Grand Trunk Railway on the south side past Crescent Beach and Erie Beach, thence parallel to the old Huron and Erie right-of-way to Fort Erie.

From Fort Erie northward it is proposed to run along Niagara Street as far as the north boundary of Fort Erie, thence along the north side of the Erie and Niagara Railway, thence northward across the Grand Trunk and Michigan Central tracks to a point on Central Avenue, in the Town of Bridgeburg.

SCHEDULE "B."

Name of Municipal Corporation.	Total amount of debentures to be issued by respective Municipalities for deposit with the Commission under Clause 2 (b).
Township of Crowland	\$203,449
Township of Humberstone	629,755
Township of Bertie	782,666
Village of Humberstone	66,194
Village of Port Colborne	141,297
Village of Fort Erie	128,007
Town of Welland	166,926
Town of Bridgeburg	90,422
<hr/>	
Total amount of bonds to be issued, mentioned in Clause 3	\$2,208,716

SCHEDULE "C."

Name of Municipal Corporation.	Districts, rateable property of which shall bear rate levied against the Corporation:
Made, passed and entered this	day of 191 .
	.....Reeve (Mayor).
	.....Clerk.

SCHEDULE "C."

By-law No. 479, of the Municipal Corporation of the Village of Fort Erie, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Village of Fort Erie and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 58, of the Municipal Corporation of the Village of Humberstone, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Village of Humberstone and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 928, of the Municipal Corporation of the Town of Welland, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Town of Welland and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 348, of the Municipal Corporation of the Town of Bridgeburg, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Town of Bridgeburg and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-laws Nos. 3053 and 387, of the Municipal Corporation of the City of St. Catharines, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the City of St. Catharines and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 417, of the Municipal Corporation of the Village of Grimsby, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Village of Grimsby and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 419, of the Municipal Corporation of the Village of Beamsville, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Village of Beamsville and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 9 of 1916, of the Municipal Corporation of the Village of Port Colborne, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Village of Port Colborne and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 542, of the Municipal Corporation of the Town of Oakville, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Town of Oakville and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 320, of the Municipal Corporation of the Town of Burlington, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Town of Burlington and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 3197, of the Municipal Corporation of the City of Hamilton, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the City of Hamilton and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 862, of the Municipal Corporation of the Township of Toronto, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Toronto and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 138, of the Municipal Corporation of the Township of Trafalgar, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Trafalgar and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 659, of the Municipal Corporation of the Township of Nelson, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Nelson and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 619, of the Municipal Corporation of the Township of East Flamboro, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of East Flamboro and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 1059, of the Municipal Corporation of the Township of Barton, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Barton and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 234, of the Municipal Corporation of the Township of North Grimsby, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of North Grimsby and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 296, of the Municipal Corporation of the Township of Clinton to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Clinton and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 619, of the Municipal Corporation of the Township of Louth, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Louth and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 387, of the Municipal Corporation of the Township of Grantham, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Grantham and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 474, of the Municipal Corporation of the Township of Humberstone, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Humberstone and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 14, 1916, of the Municipal Corporation of the Township of Crowland, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Crowland and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

By-law No. 882, of the Municipal Corporation of the Township of Bertie, to authorize a certain agreement made between The Hydro-Electric Power Commission of Ontario and the Municipal Corporation of the Township of Bertie and other municipal corporations, for the construction, equipment and operation of an electric railway under *The Hydro-Electric Railway Act, 1914*, and amendments thereto.

RIGHT-OF-WAY

As was the case in 1918, the work of this department for year 1919 has consisted largely of acquiring land for right-of-way and pole rights for high and low tension lines in various parts of the Province.

Preliminary work was commenced during the summer on the high tension line from Port Arthur to the new development work at Cameron's Falls, a distance of approximately seventy-five miles and work has also been carried on in securing pole and tree rights on the various low tension lines undertaken during the year and in carrying to completion the work begun but unfinished prior to the present year.

The work of the department for the year may be briefly summarized as follows:

High-Tension Lines

1. The acquiring of the outstanding lands required in connection with the Queenston-Chippawa Development, being chiefly confined to lands along the Chippawa Creek required in connection with the deepening of the channel of that stream.

2. Investigation of titles and preliminary work on the Port Arthur-Nipigon Line.

3. Negotiations for lands required for development work at Cameron's Falls (Nipigon).

4. Lands and flooding rights required for development purposes at High Falls.

5. Investigating titles and taking over of property of the Carleton Place power plant.

6. Purchase of lands for pole yards in the Town of Cobourg.

7. Disposal of certain lands in the Town of Oshawa no longer required by the Commission.

8. Disposal of the Trenton Waterworks System to the Town of Trenton.

9. Acquiring certain lands in the City of Peterborough in connection with the Commission's works there and the disposal of certain other lands in that place not now required by the Commission.

10. The fencing, clearing and beautifying of the lands adjoining the Eugenia Reservoir for park purposes.

11. Purchase of lands required for new station sites or enlargement of existing sites.

Low-Tension Lines

1. All the necessary tree trimming rights on the Essex County System, with the exception of a short line between Kingsville and Leamington, have now been secured. This involved a great deal of work, as no tree rights had been held on this system by the previous owners, The Essex County Light and Power Company.

2. The securing of pole, guy and tree rights on the lines between Healey's Falls and Norwood and between Norwood and Auburn on the line now under construction from Healey's Falls to Peterborough, is now going on and a large number of the rights required have been secured, but considerable work remains to be done on these lines.

3. Pole and tree rights from the new York Station to Mimico.

4. The balance of pole, anchor and tree rights on the lines of the Severn System in the neighbourhood of Barrie, Alliston, Cookstown, Tottenham, etc.
5. Tree rights on lines from Woodstock to Norwich, Tillsonburg and Ingersoll.
6. Pole and tree rights on line from Smith's Falls to Carleton Place.
7. The balance of pole and anchor rights required on the Picton-Trenton Line.
8. Tree trimming rights on the lines of the Ontario Power Company in the vicinity of Niagara Falls; as no permanent tree rights were held by this Company, it was considered advisable to secure such, and all the low tension lines of the Company have now been gone over and the necessary rights secured.

In all 66 separate parcels of land have been purchased during the year and 137 pole agreements, providing for the erection of 1,347 poles, have been secured, in addition to 275 anchor rights and 375 tree agreements. Seventy-five claims for damages have also been settled and no requests have been made for arbitrations during the year.

SURVEYS

Surveys, plans and descriptions were made to cover all property to be deeded to or from the Commission. These refer to rights-of-way for power transmission lines, power canals, sites for powerhouses, sub-stations and operator's residences and lands required for dams and flooded lands due to the construction of dams.

This necessitated the surveying of 100 miles of transmission lines, to serve various localities and 500 acres of the total 2,500 acres of land acquired at Niagara in connection with the Niagara power canal now under construction.

This land forms a solid belt from Chippawa to Queenston and owing to its continuity and extent, it will lend itself to the establishment of factory areas. When the power canal and the railway incidental thereto have been completed, this whole area will have good railway facilities, adequate supply of water for factory purposes and unlimited electrical power. The land in question also lends itself to schemes of opening up new roads, such as those projected by the Queen Victoria-Niagara Falls Park Commission. Considerable areas of land were sold by the Commission, and these sales came about in this way: It is often found that in buying land for the above mentioned purposes the entire holding of any owner may be purchased for almost the same figure as that asked for the exact amount of land required by the Commission. When several such cases occur contiguously the areas not required by the Commission may be joined together and sold for some useful purpose, whereas by themselves such areas would be useless.

Reports were made to various departments of the Commission as to riparian and other property rights in land. The Tax Department required statements showing areas and location of all property owned by the Commission. The Legal Department required the gathering of information regarding the rights of land owners to certain water powers which the Commission proposed to purchase. The Operating Department required information as to the rights of the Commission to cut trees and maintain poles on transmission lines; and various departments required plans showing the boundary lines of Hydro property.

The Hydro lands are regularly inspected to determine and mark the boundary lines on the ground and to guard against encroachment by adjoining owners.

A card index of all documents relating to Hydro lands is maintained.

SECTION II

TRANSMISSION SYSTEMS

HIGH-TENSION TRANSMISSION LINES

Transmission Line Records

Records are being secured of the physical condition of all transmission lines in such a way that they can be revised from time to time and thereby become a continuous inventory.

General

The total mileage of lines built and acquired by the Commission up to October 31, 1919, for the various systems, are indicated in the following table:—

Niagara System—110,000 volts, steel tower line	466.90
Niagara System—wood pole lines	964.52
St. Lawrence System	94.31
Severn System	167.89
Waddell's System	65.85
Eugenia System	209.66
Muskoka System	26.32
Central Ontario System	368.96
Rideau System	54.48
Essex County (now being supplied by Niagara System) ..	71.10
Ontario Power Company	85.29
Thunder Bay System	8.25
<hr/>	
2,583.53 miles	

110,000-Volt Lines, 25-Cycle—Niagara System

Section No.	From	To	Length	No. of Steel Towers	Tower spacing	No. of circuits	Conductors	Ground Cable	Length of Teleph.	Number of Teleph. Poles	No. and size of Copper B.&S. Telephone Wires
A	Niagara	Dundas	51.0	570	Feet	2	312,000 c.m. Al. S.R.	5/16" St.	54.16	2,204	4-No. 10 and 4-No. 9
AA	"	"	50.0	451	550	2	4/0 Copper	"	50.00	1,405	2-No. 9
B	Dundas	Toronto	39.1	431	630	2	312,000 c.m. Al. S.R.	"	35.87	1,519	2-No. 10 and 4-No. 9
BB	"	York	34.6	630	630	2	"	"	None	(Towers only erected)	2 No. 8 BWG
C	"	Brant	22.6	251	550	2	312,000 c.m. Al. S.R.	"	22.9	957	2-No. 10 and 2-No. 9
D	Brant	Woodstock	21.8	251	"	2	"	"	21.53	888	2-No. 10 and 2-No. 9
E	Woodstock	London	25.4	278	"	2	"	"	26.03	1,074	2-No. 10 and 2-No. 11
F	Dundas	Guelph	25.3	270	"	1	"	"	26.12	1,093	2-No. 10 and 2-No. 11
G-1	Guelph	Preston	10.6	115	"	1	266,800	"	13.92	535	2-No. 10 and 2-No. 12
G-2	Preston	Kitchener	8.1	91	"	1	"	"	7.95	400	2-No. 10 and 2-No. 12
H	Kitchener	Stratford	25.1	267	"	1	312,000	"	28.75	1,164	2-No. 10 and 2-No. 11
I	Stratford	St. Mary's	13.5	147	"	1	266,800	"	15.28	634	2-No. 10 and 2-No. 12
J	St. Mary's	London	23.6	250	"	1	"	"	27.81	1,204	2-No. 10 and 2-No. 11
K	London	St. Thomas	13.4	141	"	2	312,000	"	16.09	696	2-No. 10 and 2-No. 12
L	St. Thomas	Kent	58.0	486	660	2	3/0 Copper	"	58.04	2,370	4-No. 9
M	Kent	Essex	44.8	370	660	2	"	"	44.80	1,829	4-No. 9
			466.9							449.25	

Note—Section "A" has fifty miles 312,000 c.m. Al. S.R. and one mile 4/0 Copper.

" " "B" has 35.3 miles 312,000 c.m. Al. S.R. and 3.8 miles 4/0 Copper.

" " "B" has 3 only circuits of copper telephone two No. 9 and one number 10.

" " "The fourth circuit is No. 8 B.W.G. copper-clad steel.

" " "H" has 23.9 miles 312,000 c.m. Al. S.R. and 1.2 miles 266,800 c.m. Al. S.R.

LOW-TENSION TRANSMISSION LINES

Of the lines listed above, there were completed by the Line Construction Department up to October 31, 1919, 1,676.39 miles of low-tension transmission lines of voltages varying from 2,200 to 46,000 volts.

The mileage of these lines is distributed among the various systems as follows:

Niagara System	964.52
St. Lawrence System	94.31
Severn System	167.89
Waddell's System	65.85
Eugenia System	209.66
Muskoka System	26.32
Central Ontario System	93.36
Rideau System	54.48
	<hr/>
	1,676.39 miles

On October 31, 1919, there were under construction 41.40 miles of low-tension lines of voltages varying from 22,000 to 44,000 volts, also 50 miles of high-tension lines of 110,000 volts on the Thunder Bay System. The mileage of these lines is distributed among the various systems as follows:

Niagara System .....	....
St. Lawrence System .....	....
Severn System .....	....
Waddell's System .....	....
Eugenia System .....	....
Muskoka System .....	....
Central Ontario System	27.40
Rideau System	14.00
Thunder Bay System	50.00
	<hr/>
	91.40 miles

In the construction of the low-tension lines which were completed October 31, 1919, 10,874.07 miles of wire, weighing 8,135,037 pounds, 76,656 wood poles and 446 steel towers were used.

On the transmission line poles, 1,467.66 miles of single-circuit telephone line has been erected for use in operating the system.

During the year an average of nine gangs were employed by the Line Construction Department.

On transmission lines four pole-erecting gangs and three wire-stringing gangs were engaged. On municipal distribution systems and rural line construction two gangs were engaged. These gangs constructed 115.21 miles of transmission lines as well as distribution systems in eleven towns and villages and rural lines in four townships.

For the above lines forty-one crossing plans were prepared and submitted to telephone, power or railway companies for approval.

Local distribution systems were constructed by the Commission in the towns and villages of: Hanover, Neustadt, Perth, Bloomfield, Thistletown, Wellington, Bradford, Chippawa, and line extensions were made in the Townships of Dereham, North Norwich, Scarboro and South Dorchester.

Wood Pole Transmission Lines 2,200 to 44,000 Volts

115.21 miles of transmission lines were completed during the past year and 91.40 miles were under construction at the close of the year, making a total of 206.61 miles. The work is divided up among the different systems as follows:

LINES COMPLETED AND UNDER CONSTRUCTION

October 31st, 1918, to October 31st, 1919

Voltage	Completed	Under Construction	Total
44,000.....	56.38	27.40	83.78
26,400.....	37.98	.....	37.98
22,000.....	.....	14.00	14.00
13,200.....	.....	.....	.....
6,000.....	.....	.....	.....
4,000.....	14.85	.....	14.85
2,200.....	6.00	.....	6.00
110,000.....	.....	50.00	50.00
TOTAL	115.21	91.40	206.61

MILES OF TRANSMISSION LINES COMPLETED AND UNDER CONSTRUCTION BY THE LINE CONSTRUCTION DEPARTMENT FOR THE VARIOUS SYSTEMS

October 31, 1918, to October 31, 1919

Niagara System	18.54
St. Lawrence System	27.96
Severn System .....	.....
Wasdell's System .....	.....
Eugenia System	2.31
Muskoka System .....	.....
Central Ontario System	55.82
Rideau System	51.98
Thunder Bay System	50.00
	<hr/>
	206.61 miles
Span Miles Single Circuit	206.61
Double Circuit .....	.....
3 Circuits .....	.....
4 Circuits .....	.....
	<hr/>
	206.61 miles
Power Conductors—	
Steel Reinforced Alum.	129.38
Aluminum	25.39
Copper	20.85
Steel	30.99
	<hr/>
	206.61 miles
Ground Cable—	
Steel	198.30
Iron	2.31
	<hr/>
	200.61 miles
Telephone—	
No. 9 B.W.G. Iron	108.36
3 x 13 Steel	77.40
	<hr/>
	185.76 miles
Aluminum—	
3/0	25.39
1¼/0 Steel Reinforced	51.98
4/0 Steel Reinforced	77.40
	<hr/>
	154.77 miles

Copper—	
No. 4 Copper	1.68
No. 6 Copper	19.17
	<hr/>
	20.85 miles
Steel Cable Power	30.99 miles
Ground Cable—	
1/4" Steel	8.92
9/32" Steel	104.36
5/16" Steel	3.62
No. 6 B.W.G. Iron	2.31
	<hr/>
	119.21 miles

SUMMARY

Conductor—	
Aluminum	102.79
Steel Reinforced Alum.	51.98
Copper	20.85
Steel	30.99
	<hr/>
	206.61 miles
Ground Cable—	
No. 6 B.W.G. Iron	2.31
Steel	116.90
	<hr/>
	119.21 miles
Telephone—	
No. 9 B.W.G. Iron	108.36
3 x 13 Steel	77.40
	<hr/>
	185.76 miles
Total Mileage Wood Pole Lines—	
Completed	115.21
Under Construction	91.40
	<hr/>

206.61 miles

Average spans for poles 132 feet, 150 feet, 160 feet, 300 feet and 330 feet.

Total Mileage of Lines and Number of Poles

	To Oct. 31st, 1918	Oct. 31st, 1918, to Oct. 31st, 1919	Total to Oct. 31st, 1919
Total mileage low tension lines completed	1,561.18	115.21	1,676.39
Total mileage low tension lines under construction..	98.27	91.40	91.40
Total mileage single circuit lines completed	1,169.51	115.21	1,284.72
Total mileage double circuit lines completed....	361.48	.....	361.48
Total mileage three circuit lines completed.....	29.09	.....	29.09
Total mileage four circuit lines completed	1.10	.....	1.10
Total mileage telephone lines completed.....	1,373.30	94.36	1,467.66
Total mileage telephone lines under construction..	.....	91.40	91.40
Number of poles	72,856	3,800	77,102
Number of towers	442	4	

TRANSMISSION AND TELEPHONE LINES

Total Weights and Mileages of Cable and Wire

Cable and Wire	Wire Miles			Weights in Pounds		
	Completed to Oct. 31st, 1918	Completed Oct. 31st, 1918 to Oct. 31st, 1919	Under con- struction Oct. 31st, 1919	Completed Oct. 31st, 1918	Completed Oct. 31st, 1918 to Oct. 31st, 1919	Under con- struction Oct. 31st, 1919
Aluminum	4,053.64	76.17	.....	2,801.922	62,459	.....
Steel Reinforced						
Aluminum....	726.61	113.94	274.20	396.724	102,204	393,404
Copper Wire.....	1,006.52	62.55	.....	2,439.898	27,453	.....
Copper Clad Steel	1,217.36	.....	.....	230,466	.....	.....
Galv. Iron Wire...	1,650.45	191.03	28.00	718,359	58,883	8,540
Galv. Steel						
Cable....	1,565.93	209.87	246.20	1,096.067	200,602	145,970
Total.....	10,220.51	653.56	548.40	7,683.436	451,601	547,914

The Mileage of Lines Tabulated According to Voltage and Number of Circuits

—	Single Circuit Totals				Double Circuit Totals				Three Circuit Totals				Four Circuit Totals				1-2-3-4-Circuit Totals			
	Completed Oct. 31, 1918.	Completed Oct. 31, 1918	Under Construction Oct. 31, 1919	Completed Oct. 31, 1919	Completed Oct. 31, 1918	Completed Oct. 31, 1918	Under Construction Oct. 31, 1919	Completed Oct. 31, 1919	Completed Oct. 31, 1918	Completed Oct. 31, 1918	Under Construction Oct. 31, 1919	Completed Oct. 31, 1919	Completed Oct. 31, 1918	Completed Oct. 31, 1918	Under Construction Oct. 31, 1919	Completed Oct. 31, 1919	Completed Oct. 31, 1918	Completed Oct. 31, 1918	Under Construction Oct. 31, 1919	Completed Oct. 31, 1919
Voltage																				
46,000 }	81.48	56.38	27.46																	
44,000 }																				
26,400..	295.00	37.98			124.15															
22,000..	256.62		14.00		142.83															
13,200..	311.95				88.54															
12,000..					1.56															
6,600..	13.00				3.75															
4,000..	192.92	14.85																		
2,200..	18.54	6.00			.63															
110,000			50.00																	
Total.	1,169.51	115.21	91.40		361.48	29.09				1.10							115.21	91.40	1,676.39	

Gauge, Length and Weight of Conductors
TRANSMISSION LINES

Browne & Sharpe Gauge	Wire Miles		Weight Pounds			Miles Single Circuit Lines			Miles Double Circuit Lines			Total Single Circuit and Double Circuit Lines completed Oct. 31, 1919
	Completed to Oct. 31, 1918	Completed Oct. 31, 1918 to Oct. 31, 1919	Completed Oct. 31, 1918 to Oct. 31, 1919	Completed Oct. 31, 1918 to Oct. 31, 1919	Under construc- tion to Oct. 31, 1919	Comple- ted to Oct. 31, 1918	Comple- ted Oct. 31, 1918 to Oct. 31, 1919	Under construc- tion to Oct. 31, 1919	Comple- ted to Oct. 31, 1918	Comple- ted Oct. 31, 1918 to Oct. 31, 1919	Under construc- tion to Oct. 31, 1919	
400,000 c.m. Alum.	1.54	.....	3,032	.....	.....	.....	49	.....	49	.....	.....	49
4/0 Aluminum.....	183.85	.....	243,049	.....	.....	.....	30.49	.....	30.49	.....	.....	30.49
3/0 " ".....	2,088.96	.....	1,738,848	62,459	.....	217.50	439.61	.....	439.61	.....	.....	465.00
2/0 " ".....	89.46	.....	58,954	.....	.....	.....	14.20	.....	14.20	.....	.....	14.20
1/0 " ".....	1,045.01	.....	546,539	.....	.....	225.16	278.41	.....	278.41	.....	.....	278.41
2 S.R. " ".....	644.82	.....	211,500	.....	.....	117.85	161.28	.....	161.28	.....	.....	161.28
1 1/2 S.R. " ".....	610.06	.....	296,942	.....	.....	194.33	194.33	.....	194.33	.....	.....	194.33
1/0 S.R. " ".....	76.68	.....	69,242	102,204	37,674	25.56	25.56	14.00	25.56	.....	.....	63.54
4/0 S.R. " ".....	39.87	.....	30,540	.....	.....	12.66	12.66	.....	12.66	.....	.....	12.66
250,000 c.m. Copper	1.54	.....	6,246	.....	.....	.....	49	.....	49	.....	.....	49
4/0 Copper.....	154.35	.....	520,931	.....	.....	.....	16.75	.....	16.75	.....	.....	16.75
2/0 " ".....	126.18	.....	272,819	.....	.....	41.30	41.61	.....	41.61	.....	.....	41.61
1/0 " ".....	227.09	.....	1,386,427	.....	.....	57.93	66.03	.....	66.03	.....	.....	66.03
2 " ".....	10.71	.....	11,331	.....	.....	3.40	3.40	.....	3.40	.....	.....	3.40
4 " ".....	148.97	.....	100,077	3,356	.....	47.56	48.19	1.68	48.19	.....	.....	49.87
6 " ".....	337.68	57.51	142,067	24,097	.....	108.75	108.75	19.17	108.75	.....	.....	127.92
1/4 in. Steel Cable.	148.59	8.92	95,995	5,646	.....	9.60	9.60	8.92	9.60	.....	.....	18.52
9/32 " ".....	29.75	.....	25,139	174,070	.....	.....	132.78	.....	.....	.....	.....	132.78
7/16 " ".....	.....	7.71	.....	16,684	.....	.....	.....	.....	.....	.....	.....	.....
5/16 " ".....	190.98	3.62	216,762	4,202	.....	63.66	63.66	3.62	63.66	.....	.....	67.28
6 B.W.G. Iron.....	200.70	2.31	118,145	1,323	.....	61.67	61.67	2.31	61.67	.....	.....	63.98
Total.....	6,356.23	464.84	6,094,585	394,041	393,404	1,188.09	1,577.18	234.42	91.40	1,577.18	.....	1,811.60

Size of Telephone Wire used on Telephone Lines

COMPLETED OCT. 31, 1918-OCT. 31, 1919

Section No.	Mileage	Gauge	Section No.	Mileage	Gauge
C.O.L. 51	17.62	9 B.W.G. Iron			
C.O.L. 52	10.80	9 " "			
R.L. 1.....	21.03	9 " "			
R.L. 2.....	16.95	9 " "			
St. L. 8.....	25.39	9 " "			
St. L. 12.....	2.57	9 " "			
Total.....	94.36	.....		

Size of Telephone Wire used on Telephone Lines

UNDER CONSTRUCTION OCT. 31, 1919

Section No.	Mileage	Gauge	Section No.	Mileage	Gauge
C. 14 x 31-1....	E 10.25	3 x 13 Steel			
C. 31 x 19-1....	E 17.15	3 x 13 "			
R. 55 x 5-1....	E 14.00	9 B.W.G. Iron			
P. 51 x 52-1....	E 22.00	3 x 13 Steel			
P. 52 x 53-1....	E 9.50	3 x 13 "			
P. 53 x 54-1....	E 18.50	3 x 13 "			
Total.....	91.40	.....		

"E" estimated

TELEPHONE LINES

Gauge, Length and Weight of Copper Clad Steel and Galvanized Iron Wire

Gauge	Wire Miles				Weight in Pounds				Single Circuit Mileage			
	Completed to Oct. 31st, 1918	Completed Oct. 31st, 1918	Under con- struction to Oct. 31st, 1919	Completed to Oct. 31st, 1919	Completed to Oct. 31st, 1918	Completed Oct. 31st, 1918	Under con- struction to Oct. 31st, 1919	Completed to Oct. 31st, 1919	Completed Oct. 31st, 1918	Completed to Oct. 31st, 1918	Under con- struction to Oct. 31st, 1919	Completed to Oct. 31st, 1919
No. 8 B. & S. C.C. steel..	207.52	.....	.....	207.52	50,842	.....	.....	50,842	103.76	.....	.....	103.76
No. 10 “ “	1,006.90	.....	.....	1,006.90	181,638	.....	.....	181,638	503.45	.....	.....	503.45
No. 9 B.W.G. Iron..	1,248.86	188.72	28.00	1,437.58	432,549	57,559	8,540	490,108	624.43	94.36	14.00	718.79
No. 10 B.W.G. Iron	283.32	.....	.....	283.32	70,580	.....	.....	70,580	141.66	.....	.....	141.66
No. 3 x 13 Steel	.....	.....	154.80	.....	.....	.....	62,075	.....	.....	.....	77.40	.....
Total....	2,746.60	188.72	182.80	2,935.32	735,609	57,559	70,615	793,168	1,373.30	94.36	91.40	1,467.66

The conductor material inspected during the year for all purposes is as follows:

No. 4 Copper	63,600 lbs.
No. 2 Aluminum Steel Reinforced	13,600 "
125,000 C.M. Aluminum S.R.	2,900 "
211,600 C.M. Aluminum S.R.	442,000 "
312,000 C.M. Aluminum S.R.	190,000 "
Steel—3 strands No. 13 B.W.G.	19,500 "
9/32" Steel	47,600 "
5/16" Steel	150,000 "
4/0 Copper Trolley	80,000 "

Insulators inspected during the year:

110,000-volt units—Suspension	33,000
44,000-volt units—Pin type	13,074
2,200-volt units—Pin type	112,000
Strain insulators for Guys	2,400

NIPIGON LINES

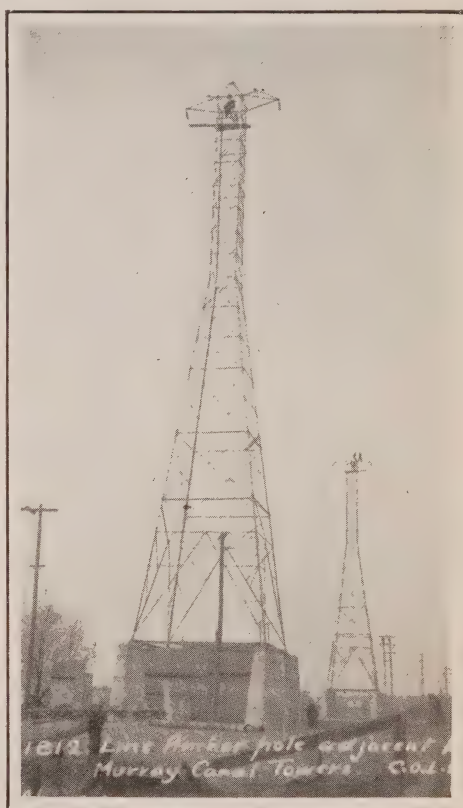
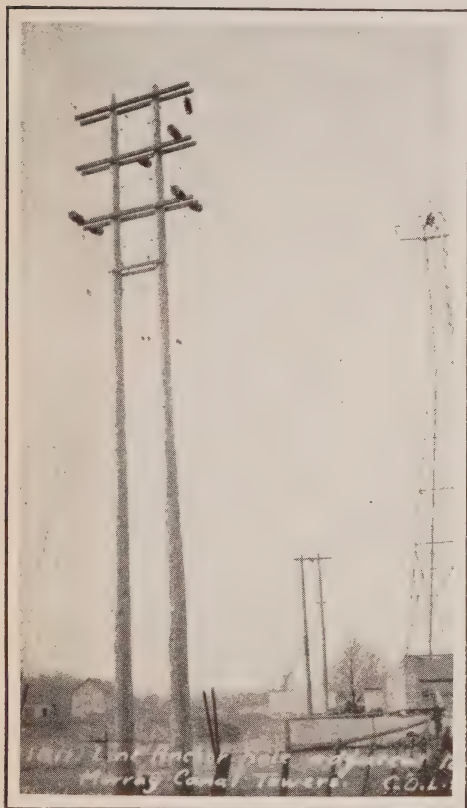
Early in the year surveys were undertaken for a 110,000-volt transmission line between Cameron's Falls, on the Nipigon River, and the terminal cities of Port Arthur and Fort William. Considerable preliminary work had been done under war conditions and it was decided at that time that lines which would provide for minimum capital expenditure should be constructed. Work was, therefore, undertaken in the spring of 1919 on a 110,000-volt wood pole line. The line runs south from Cameron's Falls, paralleling the Nipigon River at a distance of from one to five miles to Sprucewood on the Canadian Pacific Railway, thence westerly paralleling the Canadian Pacific Railway to Loon Station. At this point it is carried cross country to the vicinity of the Canadian National Railways, which it parallels to the easterly boundary of the Municipality of Port Arthur, near which point it is expected that one of the terminal stations will be located. This line has been laid out by co-operating with the Department of Lands, Forests and Mines, so that the provincial highways projected easterly from the terminal cities may follow the same right-of-way. The conductors consist of an envelope of stranded aluminum of 211,600 c.m. over a core of galvanized steel cable, which is introduced to improve the strength of the combined conductor. These conductors are supported by wood poles spaced approximately 325 feet using wooden arms, wish-bone type, and suspension insulators, there being seven standard units at each point of support. The conductors are located at the corners of a triangle. In addition to these power conductors the pole supports a 9/32-inch steel ground cable at the top, and two telephone conductors consisting of three strands of No. 13 B.W.G. iron wire on an arm below the power conductors. This line is 69 miles long and it is intended that it shall deliver from 17,000 to 30,000 horse-power at the terminal cities. It runs through rather rough and sparsely inhabited country, the original clearing being 80 feet wide. Advantage was taken of all physical conditions which would improve fire risk in this district.

Considerable progress has been made during the year with the construction work. Over one-half of the poles have been erected and about three-quarters of the right-of-way cleared. About 20 per cent. of the conductor has been erected.

As these lines parallel the railway for a considerable distance much attention has been given to the transposing of the line so as to reduce to a minimum the interference in properly constructed adjoining communication lines. Anchor poles will be installed. Additional circuits are being considered.

WELLINGTON-PICTON SERVICE

A 44,000-volt line which tapped the Trenton-Brighton section of the Central Ontario System so as to serve Wellington-Picton district was completed during the year. On account of the large number of trees on the roads and because the roadways were very crooked in this district, it was decided to build this line largely cross country paralleling the right-of-way of the Canadian National Railways. Pole rights with right of entry on properties were purchased; the average price being \$4 per pole. The line is generally located 12 to 16 feet from the right-of-way fence so as to provide conveniently for the turning of a headland between the pole and the fence. The conductor for this line is 9/32 inch diameter steel, and is



carried as single-circuit construction on 40-foot poles equipped with three-piece pin type insulators. Two of the insulators are carried on a long lower arm. The third insulator is carried at one end of the upper arm with the ground wire on a telephone insulator at the other end. A special approach anchor pole is shown in Photograph 11811. Two No. 9 B.W.G. steel telephone wires are carried on 2-pin arm below the power wires with suitable clearance. The spacing of poles is 176 feet.

The line parallels the Canadian National Railways from a point 1½ miles south-east of Trenton to Picton. At the Murray Canal the conductors are supported in a horizontal plane by two steel towers 145 feet in height so as to give a clearance above the water of 125 feet.

Disconnecting switches with fuses are used at the point where the line leaves the Trenton-Brighton section of the Central Ontario System, and at the Wellington-

ton and Picton Station structures. Four thousand-volt wires are carried on these poles with standard clearances by a 4-pin arm located between the telephone and high tension wires. Strain insulators were used at all corners.

About 100 pressure treated southern pine poles were used on this line as a trial installation.

Photograph No. 10706 shows the junction pole at which the Picton Line was tapped into the Trenton-Brighton section of the Central Ontario System. This, also, shows the standard type of construction used for that section.

Photograph No. 11812 shows the crossing towers for the Murray Canal under construction and their approaches.

Photograph No. 12370 shows the standard construction for this line and the approaches to Wellington Station.

Photograph No. 12369 shows the junction pole structure at Wellington, also, the Wellington outdoor station and typical standard pole.



HEALEY FALLS-PETERBORO TIE LINE

The Municipalities in the Peterboro-Lindsay districts have to date been supplied with power at 44,000 volts from the Trenton and Healey Falls Generating Stations by way of Port Hope. This is an indirect route, and in order to improve the service at the above voltage to these municipalities and the Port Hope-Oshawa districts, the building of a 44,000-volt tie line between the Healey Falls and Auburn Stations was authorized.

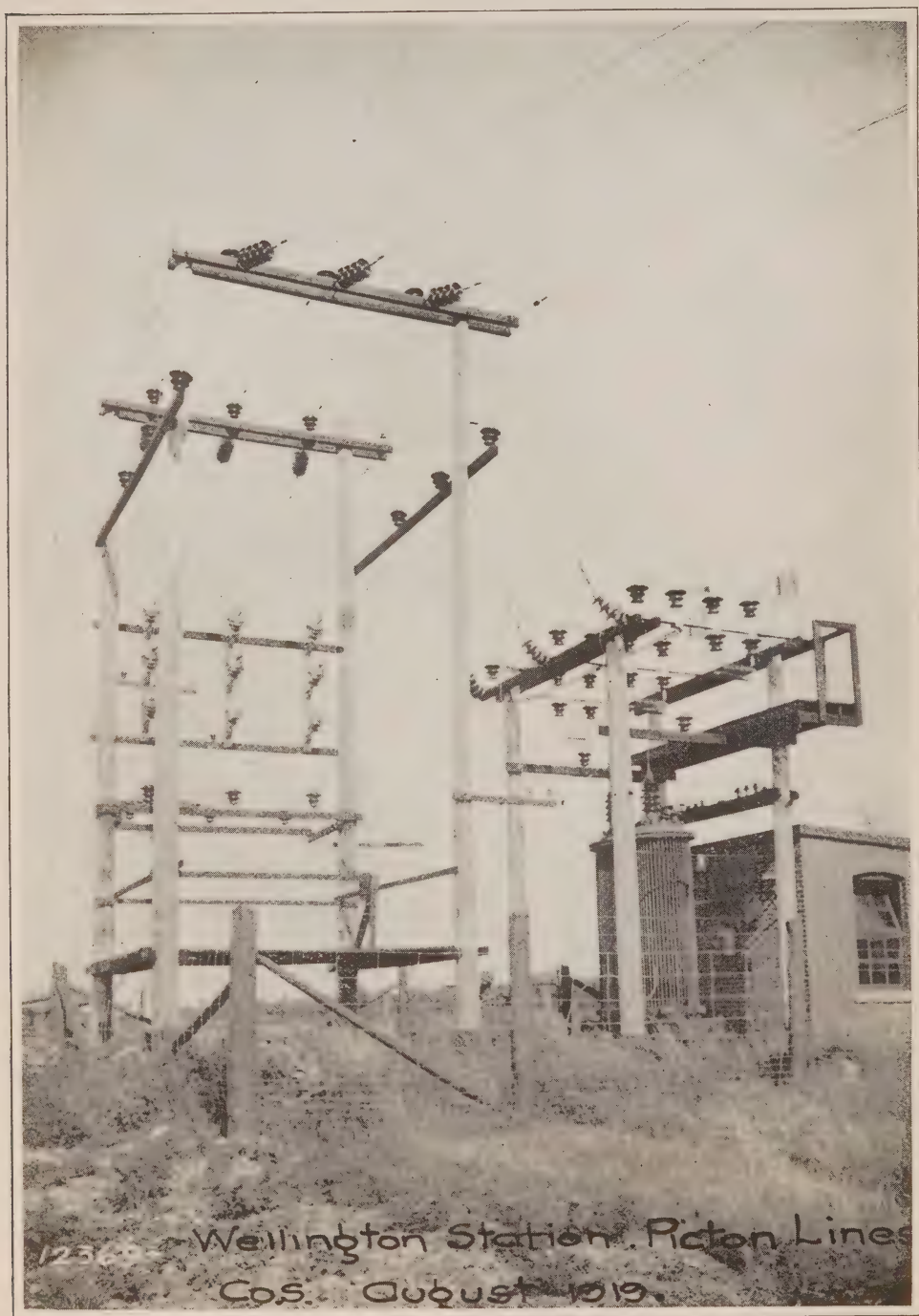
Since the line could be built some four miles shorter by going across country rather than along the highways, cross-country pole rights have been secured. The line leaving the Healey Falls Station goes in a north-westerly direction across the Trent River to an east and west road, which lies immediately south of the Town of Norwood. It follows this road for some ten miles then goes from a point near Indian River in a north-westerly direction across country to the Auburn Station.

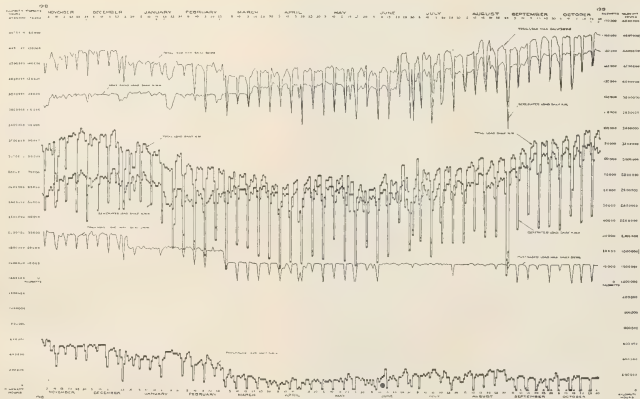
Two crossings of the Trent Canal are encountered, one of which will be carried on steel towers. Standard construction consists of 40-foot poles at an average spacing of 325 feet, carrying three 4/0 S.R.A.C. power conductors supported by wooden arms, wish-bone construction, a 9/32-inch steel sky cable and two telephone conductors.

In the Municipality of Peterboro, it was found necessary to carry some local service wires in addition to the above. The power conductors are insulated with suspension insulators. Two only are being used at the present time. Provision is made in the construction for additional units in case the voltage or other operating characteristics of the line are altered. Pressure treated southern pine poles were used for this line. A number of line anchors and dead-ending structures have been introduced into this line. About one-half of the structures are erected and materials for stringing conductors have been assembled.



12570-Hydro. Sta. E. Wellington Sta. - Pylon Line C.O.S. Aug. 19





THE ONTARIO POWER COMPANY
SUMMARY OF DAILY LOADS
1918-1919

SECTION III.

OPERATION OF THE SYSTEMS

Operation of Ontario Power Company 1918-1919

The plant and transmission lines of the Ontario Power Company, which were taken over by the Hydro-Electric Power Commission on August 1, 1917, are controlled and operated from the Commission's executive office in Toronto, where all administration engineering, etc., is carried on. The beginning of the present financial year found the country at war and every industry concentrated on the production of munitions and essential materials. All manufacturing establishments were working at top-notch, with a resultant demand for power that was unprecedented. This plant was running to capacity practically twenty-four hours per day.

In order to somewhat relieve the situation an extension to the plant which was being constructed for the Ontario Power Company by the Hydro-Electric Power Commission, was being pushed with all possible speed. The construction of the powerhouse extension was handled by the Construction Department of the Commission, but the installation of the electrical equipment was handled by the regular maintenance staff along with their other work.

The effect of the close of the war began to be noticeable about the beginning of 1919, and with the changing load condition, many rearrangements of machines became necessary. At the present time, the grouping of generators and loads is the most flexible in the history of the plant, and the liability of trouble due to short-circuits, or interruptions due to failure of equipment, has been greatly reduced.

With the change in load conditions and the completion of construction work more opportunities for carrying on maintenance work became available. On account of the shortage of competent help during the war, and the necessity of developing the full output of the plant continuously, some work had to be left undone until the beginning of this year; since that time work on overhauling equipment has been pushed.

In the powerhouse, new cast steel runners have been installed in No. 12 turbine, all other turbines have been overhauled. Turbines Nos. 11, 12, 13, and 14 have been painted completely and all other machines have been painted and cleaned where necessary. A new air compressor has been installed for supply of air for cleaning purposes.

The whole interior of the powerhouse has been cleaned, and modern high-efficiency lamps have been installed in the lighting fixtures. Drinking fountains, supplied with city water, have been erected for the use of employees.

All motors and starters on blowers and sump pumps were overhauled.

In the valve chamber new operating mechanism of improved design has been installed on Units Nos. 7 and 12. A new high-pressure, two-stage centrifugal pump with a 10-inch suction from No. 7-2 penstock and with an 8-inch discharge

connecting to the existing water system, and to the Hydro-Electric Power Commission's Niagara Station was also installed.

The entrance house and the passenger tunnels to the powerhouse and distributing station were re-decorated.

At the ice diverter, repairs were made to railings and stop logs and new logs placed in position where necessary. All exposed iron work was thoroughly cleaned and painted.

The railings around the forebay were cleaned, painted, and necessary repairs made. The roof of the screen house was repaired and a new expansion joint placed in the tile to prevent breakages. Ironwork was repaired and painted. The walls of the building were repaired by cutting out damaged portions of the Roman stone and refilling with concrete.

Railing, doors, and fittings in the gate house were repaired and painted. A temporary motor for the operation of No. 3 Stony gate was installed pending the delivery of permanent equipment.

In the distributing station, all necessary repairs to the building were carried out. Drinking fountains were installed for employees.

All oil switches were overhauled. There was only one serious interruption due to the failure of an oil switch during the year.

One 12,000/60,000-volt, 3,000-kv-a. transformer failed and had to be repaired and rebuilt.

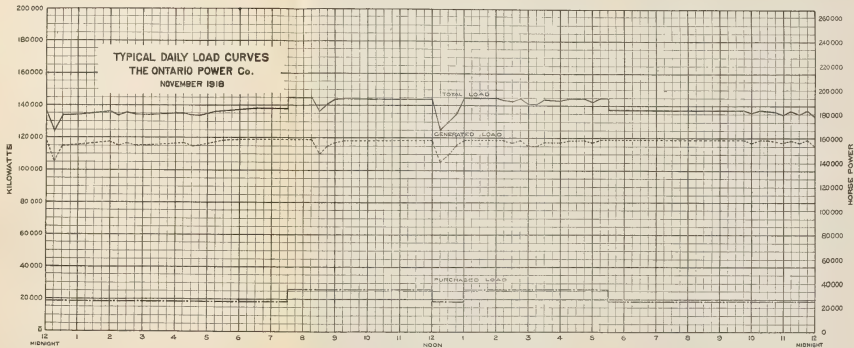
A large amount of cable work due to re-location of generator and other connections was carried out. There were no cases of cable failures or of trouble in splices or potheads.

Nine special type of choke coils were built for the Hydro-Electric Power Commission.

Several radical improvements in our protective relay system have been carried out. Previously it was impossible to operate with a ground resistance connected to the neutrals of more than one group of generators at a time, due to the disturbance created in our relay system by the 75-cycle third harmonic current which circulated under these conditions. A relay has been developed which is inoperative on 75-cycle current but extremely sensitive to 25-cycle current. This has allowed the operation of neutral resistances with each group of machines giving full protection to all of the outgoing lines in case of grounds. A further refinement was the use of improved connections so that ground currents from our lines returning by way of the neutral resistances used at the Canadian Niagara Power Company's plant, which operates in parallel with part of this plant through the Hydro-Electric Power Commission, Niagara Station, would still operate our relays and trip out our defective line even though insufficient current returned by way of our own neutral resistances to affect our relay.

During the year, 925,365,500 kilowatt hours were generated and 83,591,900 kilowatt hours purchased, making a total of 1,008,957,400 kilowatt hours sold. The maximum generated peak load occurred on October 28th, and amounted to 151,500 k.w. or 203,080 horse-power. The total peak, including purchased power, was 162,400 k.w., or 217,700 horse-power, occurring the same day.

It is interesting to note that to generate the same amount of power as was generated by the Ontario Power Company, exclusive of the purchased power, by the use of the best large-capacity steam plants yet built, would require more than 648,000 tons of the best steam coal or about 1,800 tons per day, including Sundays and holidays.



Niagara System

During the past fiscal year the operation of the Niagara System has reached a higher point of efficiency than has hitherto been attained. This result has been achieved by further successfully overcoming certain minor operating difficulties experienced in past years.

With the cessation of hostilities in November, 1918, a large block of power used by the manufacturers of munitions, became available for purely domestic manufacturing. As a remarkable evidence of the rapid readjustment of industrial conditions, this excess power was very quickly absorbed, as will be noted from a comparison of the municipal peak loads in October, 1918, and October, 1919, and also from the load curve attached.

The service supplied by the Ontario Power Company left little to be desired. Notwithstanding severe operating conditions due to the insufficient generating capacity, continuous service was maintained. During the year the company's plant was increased by the addition of two new generators, Nos. 15 and 16. In addition No. 3 pipe line was completed and put in service. This increase in capacity although still insufficient, due to the continued rapid growth of the system, added materially to the already very reliable service.

In addition to the supply from the Ontario Power Company, the Canadian-Niagara Power Company generated continuously for the Niagara System 50,000 horse-power. This service too, was very reliable and satisfactory in every way.

Fortunately the weather conditions at Niagara during the winter months were very favourable and with the continued mild weather there was little, if any, ice trouble to decrease the output, such as has been experienced in other years.

Practically continuous service was maintained on the high-tension system throughout the year. The only system interruptions were caused by circumstances entirely uncontrollable. The operating efficiency of the system can best be demonstrated by the fact that the total elapsed time of all system interruptions for the year was under one hour.

The same exhaustive system of insulator testing as used in the past few years was again carried out. Each unit was meggered, at least once, and replaced if showing signs of lessened dielectric strength. The efficacy of this system is shown by the fact that not one case of high-tension insulator failure was experienced.

The period during which electrical storms were experienced extended from February 28th to October 26th. During this period forty-one storms were reported, and of these three traversed the entire system and were very severe. The protective devices so satisfactorily handled the discharges that no system interruption was caused by lightning.

During the year the capacity of Niagara Transformer Station was increased by the addition of three 7,500 kv-a. units. At Toronto Station, three 5,000 kv-a. units were added. At Niagara Station also a more improved system of neutral grounds was installed.

In the New Toronto district the load increased very rapidly due to the industrial activity, and in order to maintain the service at the required standard it was decided to erect a temporary high-tension station just north of Mimico. The question of a permanent station at this point had previously been investigated but the present necessity made this impracticable. The construction work of this station, known as York, was carried out by the Operating Department. The work was started about August 25th and the station completed and in service October 10th. A noteworthy feature in this construction, besides the short elapsed time

necessary for the work, is the outdoor switching structure developed by the Operating Department, which sectionalizes the B-3 high-tension line so that York can be fed either through Cooksville or Toronto Stations.

It is at present proposed to erect this type of outdoor switching structure at Brant and Woodstock Stations, so that these stations can be tied in on high-tension, "Dundas to London through line," in case of necessity or as operating conditions demand.

The work of re-stringing the original tower line, Section A, from Niagara to Dundas was completed in December, 1918. This double circuit is now composed of 6/0 steel reinforced aluminum. The increased cross-section has considerably reduced the line loss and consequently resulted in better voltage regulation. An important factor too is the gain in mechanical strength due to the steel reinforcing.

The transmission voltage on the Galt feeders from Preston high-tension station was increased from 6,600-volt to 13,200-volt in March, 1919. Because of the large amount of power taken by Galt, this change was considered necessary to improve the service.

On February 1, 1919, the Operating Department took over the operation of the system supplying the municipalities in Essex County and known as the Essex County System. This distribution system acquired by the Commission from the Detroit Edison Company, was operated at 60-cycles, but on its purchase arrangements were made to change the equipment for 25-cycle operation. This change was completed and the system first supplied with 25-cycle power from the Essex High-Tension Station, February, 1, 1919. The municipalities in this system include, Amherstburg, Harrow, Leamington, Kingsville, Cottam, Canard River and Essex, and together make an important addition to our distribution system.

A regular routine of inspection of all equipment, both high and low tension, was carried out by the Station Maintenance Department, repairs being made when necessary. Special attention was again given to oil filtration. Continued skilful workmanship has been shown in the repair of transformers and rotating apparatus.

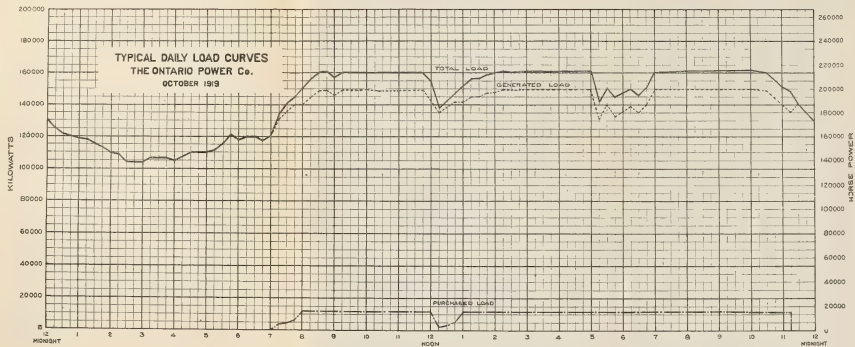
Beside the constant patrolling and repairing of all lines the Line Maintenance Department carried out all insulator testing. The re-stringing of Section A was completed, and in addition various air break switches for sectionalizing low-tension lines were erected by this department.

The Meter Department has attended to the regular inspection of meters, switchboard wiring, and relays and in addition have devoted considerable attention to the accurate determination of power factor by the measurement of reactive volt-amperes, using graphic recording instruments. This department has also developed a comparatively simple method of totalizing the power supplied over any group of feeders, of various capacities, connected to a common bus or buses operating in synchronism, by means of a special totalizing current transformer.

The Meter Department has also devoted a great deal of attention to improved schemes of relay protection and in connection with this division of the work, special current transformers have been developed for use on high voltages.

In order to overcome the troubles caused by the rapid deterioration of Style B telephone entrance wiring, the Telephone Department has installed at Dundas, Preston, London, St. Thomas and Stratford Stations, during this past year, a special 3,000-volt lead covered paper insulated cable. Outdoor horn-gap arresters were installed on the lines to protect these cables.

Considerable work has also been done towards improving private telephone service by a co-ordinated system of power and telephone transpositions, thus greatly

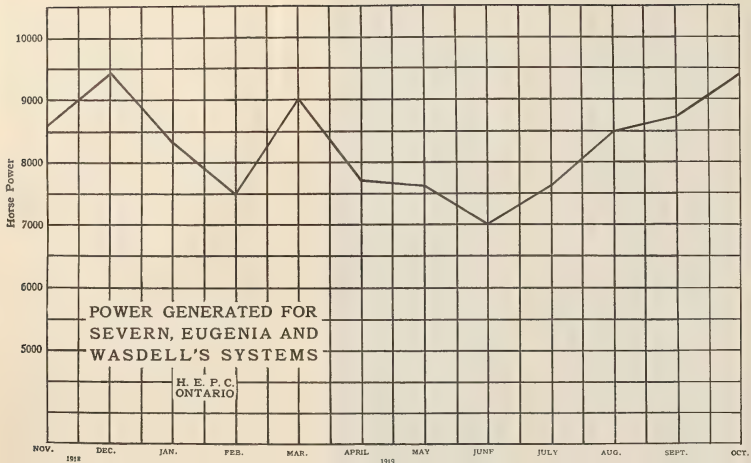


reducing inductive interference. Beside this work all telephone apparatus has been regularly inspected and repaired.

The following table gives a comparison of the loads of the various municipalities in October, 1918 and October, 1919. Again as in 1918, it has been necessary to place restrictions on the municipalities so that the table does not give the normal yearly increase.

Municipality	Load in H.P. October, 1918	Load in H.P. October, 1919	Increase
Acton	151.5	173	21.5
Ailsa Craig	51.6	103.2	51.6
Aylmer	129.3	156.8	27.5
Ayr	46	41.5	—
Baden	142.9	152.3	9.4
Beachville	191	183.6	—
Blenheim	107.2	123.3	16.1
Bolton	71.4	130.6	59.2
Bothwell	50.1	119.7	69.6
Brampton	891.4	848.5	—
Brantford	2,694.4	3,056.4	361.9
Brigden	62.3	93.8	31.5
Burford	33.5	54.7	21.2
Burgessville	28.8	29	.2
Caledonia	55.6	58.3	2.7
Chatham	1,195	1,340.5	145.5
Clinton	134.9	168.3	33.4
Comber	19.3	26.8	7.5
Cooksville	46.9	63.6	16.7
Dixie	45.5	49.6	4.1
Dashwood	7.6	9.7	2.1
Delaware	16	24.3	8.3
Dorchester	75	44.2	—
Drayton	197.6	250.6	53
Dresden	19.5	16	—
Dublin	26.2	22.5	—
Dundas	496.5	1,091.3	594.8
Dunnville	133	248	110
Dutton	103.2	101.8	—
Elmira	175.6	185	9.4
Elora	162.8	219.8	57
Embro	26	44.2	18.2
Essex County	500	911.5	411.5
Etobicoke Township	169	236	67
Exeter	134	148.7	14.7
Fergus	131	147.7	16.4
Forest	109.3	118	8.7
Galt	2,922.2	2,634	—
Georgetown	364	421	57
Goderich	363.3	362	—
Granton	52.2	39.5	—
Grantham Township	26.8	29.5	2.7
Guelph	2,835	3,255	420
Guelph Military Hospital	165	179.6	14.6
Guelph O. A. College	126.5	166.2	39.7
Hagersville	115.3	242.6	127.3
Hamilton	12,097.8	14,937	2,839.2
Harriston	71.3	122	50.9
Hensall	174.6	50	—
Hespeler	307	375.3	68.3
Highgate	95.1	76.4	—
Ingersoll	870	930.2	60.2
Kitchener	3,827	5,784.2	1,957.2
Lambeth	16.7	16	—
Listowel	292.2	372.6	80.4
London	8,427.5	10,757	2,329.5

Municipality	Load in H.P. October, 1918	Load in H.P. October, 1919	Increase
Lucan	118.3	155	36.7
Lynden	81.2	92.5	11.3
Milton	299.4	608.5	309.1
Milverton	253	274	21
Mimico	174.5	265.4	90.9
Mimico Asylum	37.5	32.1	—
Mitchell	183.6	181	—
Moorefield	35	36.2	1.2
Mt. Brydges	24.5	26.8	2.3
Niagara Falls	2,181	2,707.8	526.8
Niagara-on-the-Lake	140	158.2	18.2
New Hamburg	187.6	225.2	37.6
New Toronto	2,345.8	3,036.2	690.4
Norwich	191.7	203.3	11.6
Oil Springs	92.5	112	19.5
Otterville	21.4	34.2	12.8
Palmerston	77.7	101.8	24.1
Paris	545.6	682.3	136.7
Petrolia	341.8	383.4	41.6
Petersburg and St. Agatha	15.7	21.4	5.7
Plattsville	52.5	100.5	48
Port Credit	59.6	87.1	27.5
Port Dalhousie	85.8	122.6	36.8
Port Stanley	61.6	75.7	14.1
Preston	949	1,374	425
Princeton	10.4	8.8	—
Provincial Brick Yard	104.5	136.7	32.2
Ridgetown	120	155.5	35.5
Rockwood	35	56.3	21.3
Rodney	28.5	41.8	13.3
Sarnia	1,172	2,486.6	1,314.6
Seaforth	564.3	325.7	—
Simcoe	136.7	187.6	50
St. Catharines	5,263	3,070	—
St. George	65.7	61.6	—
St. Jacob's	33.5	92.5	59
St. Mary's	382.6	560.3	177.7
St. Thomas	1,843.2	2,356.5	513.3
Stamford Township	349	200	—
Stratford	1,374	1,662.3	288.3
Strathroy	279.4	225.2	—
Tavistock	251.2	266.7	15.5
Thamesford	68.3	95.8	27.5
Thamesville	42.2	56.3	14.1
Thorndale	56.3	120	63.7
Tilbury	88.5	87.1	—
Tillsonburg	718.5	762.7	44.2
Toronto	56,139.5	56,944	804.5
Toronto Township	152.8	146.1	—
Walkerville	2,571	2,283	—
Wallaceburg	601.8	655.5	53.7
Waterdown	80.4	100.5	20.1
Waterford	99.2	120.6	21.4
Waterloo	792.2	1,132.7	340.5
Watford	40.7	47.1	6.4
Welland	7,177.2	2,882	—
Wellesley	110	117.5	7.5
Weston	791.4	874	82.6
West Lorne	27	31.5	4.5
Windsor	1,745.2	2,775	1,029.8
Woodbrige	134	158.8	24.8
Woodstock	1,179.6	1,490	310.4
Wyoming	25.7	30.1	4.4
Zurich	53.5	59	5.5



Severn System

The operation of the Severn System has been successful throughout the year, with the demand for power increased to some extent over the previous year.

The Severn System with generating plant at Big Chute has been operated in parallel with the Eugenia and Wasdell's Systems of the Hydro-Electric Power Commission and the Orillia System of the Municipality of Orillia, and very satisfactory results were obtained with regard to stability and continuity of service for all systems concerned.

The new 1,600 kv-a. alternator with a 2,300 horse-power turbine and supply and control equipment in the Big Chute Power House extension was put into commercial operation in February. This added to a great extent to the capacity and maintenance facilities of the plant.

The alterations to the surge-tank and installation of head gates at the Big Chute Plant proved a great advantage to the operation of the plant.

The erection of a new cottage for the superintendent at the Big Chute Plant added considerably to the convenience in housing the operating staff at this plant.

A small stable and store house was erected at Buckskin Station, to store supplies and house the team, greatly adding to the facilities of transporting winter supplies in connection with the operation of the Big Chute Plant.

Certain alterations and additions to the towers supporting the high-tension and telephone lines where same cross the bay at Waubauskene, were carried out, eliminating certain defects and adding facilities for maintenance and operation.

The double-circuiting of the telephone line between Waubauskene and Fergusonvale, eliminating the overloaded condition on the single-circuit, gave increased facilities for communication with improved system operation. Special maintenance work was carried out on the telephone lines between Big Chute and Midland Stations, which resulted in more efficient communication over this section of the lines.

Severn System

Municipality	Load in H.P. October 1918	Load in H.P. October 1919	Increase
Midland.....	1,372.6	1,160.8	.....
Penetang.....	362	832.8	470.8
Collingwood.....	1,808.2	1,309.6	.....
Barrie.....	517.4	654	136.6
Coldwater.....	38.8	47	8.2
Elmvale.....	110.5	103.2	.....
Stayner.....	127.4	140.4	12.6
Creemore.....	42.2	49.5	7.3
Waubauskene.....	20.9	23	2.1
Pt. McNicoll.....	22.5	32.1	9.6
Victoria Harbor.....	23.8	46.6	22.8
Camp Borden.....	287	163.5	123.5
C.P.R. Elevator.....	1,047	1,290.7	243.7
Cookstown.....	55.2	69	13.8
Alliston.....	90	122	32
Bradford.....	2.57	38.8	13.1
Beeton.....	98.5	84.4	.....
Tottenham.....	21.3	24.7	.....
Thornton.....	7	10	3

Eugenia System

The operation of the Eugenia System, with Eugenia Falls Power House as generating station, has been successful throughout the year, with an increased demand for power from the system over the previous year.

The Eugenia System is operated in parallel with the Severn, Orillia and Wasdell's Systems, with resulting benefit to all systems.

The control room and the high-tension and low-tension switching equipment and second bank of transformers in the power house extension have been put into operation, resulting in added facilities for the operation and maintenance of the plant.

A new station entrance structure of sufficient capacity to support all outgoing power, distribution and telephone circuits was completed, which allowed for a much better arrangement of circuits leaving the power house, with greater facilities for maintenance and adding to the appearance of the plant.

Machine tools were purchased, and a small machine shop installed and put into operation in the machine shop room in the plant extension, to handle maintenance details at the plant. This has proved very useful in efficiently handling this class of work.

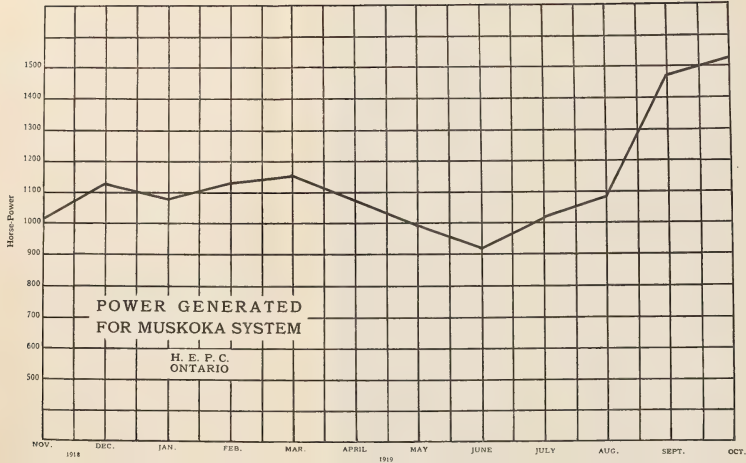
The erection of two new operators' cottages at this plant has added to the convenience and accommodation of the operating staff, and the new barn and stable conveniently houses the transportation equipment.

The new extension to the superintendent's house, which was erected this year and is used principally for the Eugenia System operating office is found very satisfactory in handling the system office work.

Considerable draining and grading has been carried out around the plant, which has been of benefit and has added greatly to the appearance. On certain portions of line sections, Eugenia Power House to Chatsworth, Chatsworth to Owen Sound, and Flesherton to Dundalk, the power circuit transpositions were altered to eliminate the inductive interference caused from the Hydro-Electric Power Commission circuits on the Bell Telephone Company's long distance lines.

Alterations and special maintenance work was carried out on a portion of the high-tension line, Eugenia Power House to Chatsworth, to meet conditions imposed by extensive improvements to the highway immediately north of Markdale.

The river crossing at Grand Valley on the section of high-tension line between Fraxa Junction and Grand Valley was remodelled to guard against the trouble caused by the ice flows at time of spring freshets.



Eugenia System

Municipality	Load in H.P. October, 1918	Load in H.P. October, 1919	Increase
Owen Sound.....	937	1,139.4	202.4
Flesherton.....	31.6	67.6	36
Dundalk.....	77.4	93.2	15.8
Durham.....	62.2	85.7	23.5
Mt. Forest.....	103	152.2	49.2
Chatsworth.....	31.6	22.2	—
Markdale.....	63.2	99	35.8
Holstein.....	6.4	9.3	2.9
Chesley.....	106.2	230.5	124.3
Shelburne.....	136.7	158	21.3
Orangeville.....	119.3	120	.7
Horning's Mills.....	5.3	5	—
Grand Valley.....	56.3	59.9	3.6
Arthur.....	131.7	159.5	27.8
Alton Foundry.....	38.6	37.5	—
Hanover.....	475.8	650	174.2
Tara.....	37.5	31	—
Elmwood.....	44.2	52.9	8.7
Mational Portland Cement.....	666.2	1,112.6	446.4
Carlsruhe & Neustadt.....	9.3	64.3	55

Muskoka System

Successful operation and distribution of power on the Muskoka System, with generating plant at South Falls, was maintained and with increased demand for power by the municipalities supplied on this system.

Certain alterations to the hydraulic equipment were made which were a benefit to operation and added facilities for maintenance.

The approach to the power house was put in good order by the building of a suitable platform at the power house entrances. This was found to be very useful in connection with the plant operation and maintenance.

The work of placing the store houses, blacksmith shop, tool house and driving shed in a good state of repair was completed. By the repairs now being carried out on the main dam, more water will be available for use at the plant during low-flow periods, and this will help to a great extent in the conservation of water for power purposes if required.

Muskoka System

Municipality	Load in H.P. October, 1918	Load in H.P. October, 1919	Increase
Gravenhurst.....	319.6	827	507.4
Huntsville.....	583	841.8	258.8

Wasdell's System

The Wasdell's System, with generating plant located at Wasdell's Falls on the Severn River, has been operated in parallel with the Orillia, Severn, and Eugenia Systems throughout the year very successfully, and also with an increase in the demand for power by the municipalities in this system.

The Wasdell's Plant, though smaller than the other three plants with which it operates in parallel, adds materially to the successful results obtained.

The excess power generated at the Wasdell's Plant above that required by the municipalities on the system, is, by aid of the parallel operation of the plants, transmitted for use on our Severn System.

During the year extensions were made to supply power to rural customers and connections made to several of our 4,000-volt lines, in the south end of the system.

Wasdell's System

Municipality	Load in H.P. October, 1918	Load in H.P. October, 1919	Increase
Beaverton.....	72.1	100.5	28.4
Brechin	35	65	30
Cannington	79.7	70.3	—
Sunderland.....	54.9	40.2	—
Woodville.....	45.5	50	4.5

St. Lawrence System

The St. Lawrence System was operating under the disadvantage of an unavoidable power shortage until May, 1919, when power was obtained from the Cedar Rapids Transmission Company at Cornwall. The Cedar Rapids Transmission Company has a double-circuit, 110,000-volt transmission line, between Cedar Rapids and Messena, passing close to the city, and the Commission has constructed a 110,000-volt station beside the Cornwall Canal, stepping down to 26,400 volts, also a line designed for 46,000-volt operation, connecting it with the existing lines at Morrisburg. The station equipment is modern and first class in every respect. Three single-phase transformers, each of 1,250 kv-a. capacity carry the load with one similar transformer as a spare, so connected that it can be substituted for either of the others in a few minutes. Provision is made for extensions to the building so that duplicate equipment can be installed to the best advantage. Although the low-tension voltage will remain 26,400 volts for the present, it can be raised to 46,000 volts when the system load requires the higher voltage for economic transmission. The system chief operator is now located at Cornwall Station and by means of private telephone connections is able to maintain a high standard of service.

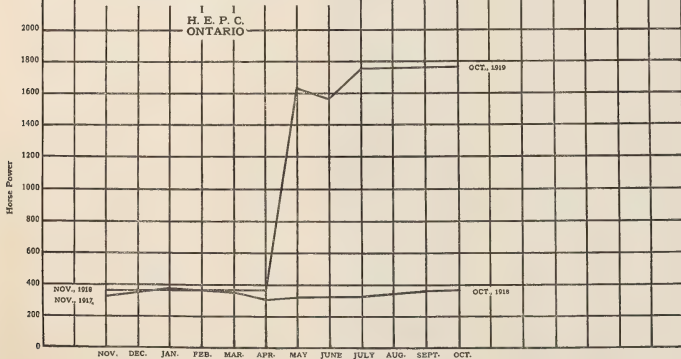
New transformer stations have been put into operation at the Toronto Paper Company, Cornwall, also at Chesterville. The former is located about three miles from Cornwall station and is fed at 26,400 volts with a single 750 kv-a. three-phase transformer stepping down to 600 volts, for distribution in the Toronto Paper Company's factory. A second transformer can be installed when required. Like Cornwall High-Tension Station, this station is modern and well equipped in every respect.

ST. LAWRENCE SYSTEM

COMPARISON OF SYSTEM PEAKS

1918 - 1919

I I
H. E. P. C.
ONTARIO



To provide for an increase in load at Chesterville, a 26,400-volt station was constructed and the line from Winchester, originally built with this in view for 26,400-volt operation, was changed over from 4,160 volts to 26,400 volts. A 300 kv-a. three-phase outdoor transformer with outdoor high-tension switching equipment was provided, the low-tension feeder equipment and metering equipment being housed in a small brick building. Chesterville is now provided with a station which is capable of taking care of its present and future requirements in a very satisfactory manner.

Alterations and improvements have also been made at Brockville to enable this municipality to discontinue the use of its steam plant and take advantage of the ample supply of power available at Cornwall. The bank of three 200 kv-a. single-phase transformers has been replaced by two 750 kv-a three-phase transformers, with improved switching facilities, including a new switchboard both for the Commission's and the municipality's apparatus. Provision for utilizing the steam plant as a standby for extraordinary emergencies or for convenience in line maintenance work was also included.

With ample installed capacity at Cornwall and numerous local improvements throughout the system, it will be seen that the past year has been a notable one in the operation of the St. Lawrence System.

St. Lawrence System

COMPARISON OF POWER SUPPLIED 1918-1919

Month	Peak H.P. Supplied 1917-1918	Peak H.P. Supplied 1918-1919	Increases
November.....	504	539	35
December.....	531	547	16
January.....	567	547	—20
February.....	547	547	0
March.....	521	550	29
April.....	491	548	57
May.....	504	1,133	629
June.....	501	1,154	653
July.....	507	1,613	527
August.....	536	1,559	1,022
September.....	540	1,748	1,208
October.....	544	1,764	1,220

NOTE — Indicates a decrease.

St. Lawrence System

COMPARISON OF MUNICIPAL LOADS—OCTOBER, 1918-1919

Municipality	Peak Load in H.P., Oct., 1918	Peak Load in H.P., Oct., 1919	Increases
Brockville.....	328	965	637
Chesterville.....	140	150	10
Prescott.....	179	251	111
Toronto Paper Co.....	...	288	288
Williamsburg.....	23	25	3
Winchester.....	76	82	6

Central Ontario System

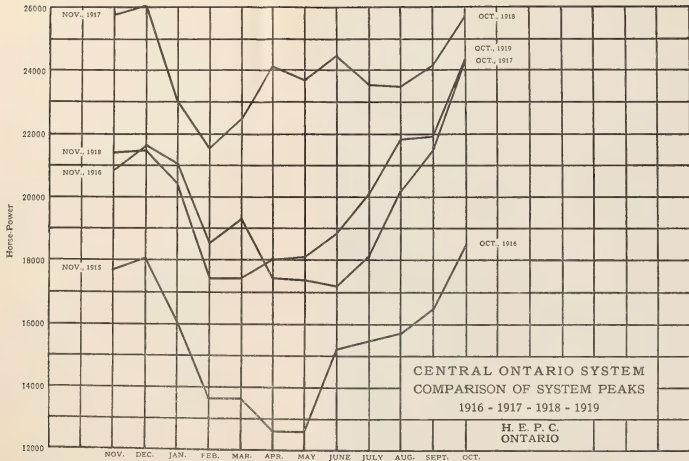
The municipalities of Picton, Wellington and Bloomfield have been added to the Central Ontario System during 1919, together with thirty miles of 9/32-inch steel, 44,000-volt line from a junction tower on the Trenton-Brighton section, through Wellington, to Picton, also 6.5 miles of 4,160-volt line from Wellington to Bloomfield. The Picton and Wellington stations are the first of their type on the Central Ontario System having a 300 kv-a., 3-phase, outdoor-type transformer, with outdoor high-tension switching equipment and a small brick transformer station, housing the low-tension switching and metering equipment. Bloomfield is fed from a 4,160-volt panel in Wellington. The operation of these stations has been very satisfactory.

The re-insulation of the original 44,000-volt lines, taken over from the Electric Power Company, Ltd., which was begun last year, has been carried out on a large scale and energetically pushed, to forestall interruptions from this source during the lightning season. The progress and results have been very gratifying. Of a total of 280.5 miles of high-tension lines requiring re-insulation, 188.0 miles have now been completed, leaving 92.9 miles to be finished next year.

Operator's houses have been constructed on or adjacent to the station sites at Bowmanville, Cobourg and Lindsay, and these stations are being equipped with suitable bell alarms, so they can be operated by one attendant. The number of operators at each station has already been reduced from two to one. At Belleville an existing house has been utilized for this purpose.

The system load has been somewhat lighter this year owing to reductions at the British Chemical Company, Trenton, and other industries engaged in war work. This reduction occurred early in the year but a readjustment soon set in, and now the load is rapidly approaching the established maximum, which will certainly be exceeded next year if the present industrial conditions and spirit of enterprise continue to prevail.

The installation of a third 3,750 kv-a. generator at Healey Falls, placed in operation in September, 1919, will materially assist in meeting this increase in load, while a 1,250 kv-a. synchronous condenser, installed at Oshawa, has provided excellent voltage regulation at this point, with improved regulation on the western section, and has relieved the system-generated current accordingly.



Central Ontario System

COMPARISON OF MUNICIPAL LOADS—OCTOBER 1918-1919

Municipality	Peak Load in H.P., Oct., 1918	Peak Load in H.P., Oct., 1919	Increases H.P.
Belleville	2,053	1,434	—610
Bloomfield .....	....	32	32
Bowmanville	1,106	1,162	56
Brighton	70	82	12
Cobourg	523	643	120
Colborne	75	86	11
Deseronto	322	268	—54
Kingston	1,285	1,710	425
Lindsay	1,328	1,247	—81
Madoc	101	125	24
Millbrook	38	30	—8
Napanee	319	338	19
Newcastle	21	27	6
Newburg and Camden East	25	434	409
Omeme	20	24	4
Orono	21	27	6
Oshawa	1,559	2,890	1,331
Peterborough	3,800	3,320	—480
Pictou .....	....	205	205
Port Hope	503	410	—93
Stirling	84	87	3
Trenton	6,135	529	—5,606
Tweed	68	105	37
Wellington .....	....	71	71
Whitby	245	263	128

NOTE — Indicates a decrease.

COMPARISON OF POWER GENERATED—FISCAL YEAR 1918-1919

Month	Peak Load H.P. 1917-1918	Peak Load H.P. 1918-1919
November	25,800	23,300
December	26,100	23,500
January	23,000	21,400
February	21,600	17,400
March	22,600	17,400
April	24,200	18,000
May	23,800	18,100
June	24,600	18,800
July	23,500	20,100
August	23,500	21,800
September	25,100	21,900
October	25,800	24,300

Ottawa System

The operation of the Ottawa System has continued highly satisfactory during the past year. The Ottawa and Hull Power and Manufacturing Company, as in the past, has maintained a high standard of service in the supply of power to this municipality. The power taken by the City of Ottawa at peak load is now in excess of 7,000 horsepower, which is a considerable increase over last year's demand.

Owing to the proportions to which this load has grown, it was decided to replace the graphic metering equipment measuring the power supplied to this municipality by higher grade and more accurate types of instruments than had previously been used. This work was taken care of by the Operating Department, Meter Section, in April, 1919.

Thunder Bay System

The operation of the Thunder Bay System has continued to be very satisfactory during the year. The power taken by the Municipality of Port Arthur from the Commission's transformer station has shown a decided increase over the previous year. During the year, it was found necessary to increase the power held in reserve from the Kaministiquia Power Company from 5,000 to 6,000 horse-power.

During the month of January, 1919, the No. 1 incoming 22,000-volt line to the Commission's transformer station was re-strung with No. 3/0 aluminum, owing to the fact that the No. 2 aluminum with which this line was previously strung had not been satisfactory, in that it did not possess sufficient mechanical strength and lacked the conductivity necessary for good voltage regulation under the present increased load conditions.

Owing to the quantities of oil held in storage and contained in transformers and oil switches at the transformer station, it was deemed advisable to increase the fire protection at this station, and accordingly additional fire pails and large capacity chemical extinguishers have been installed.

Rideau System

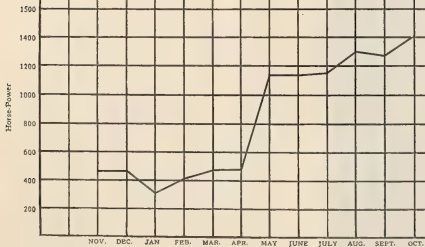
The municipalities of Perth and Carleton Place are now receiving power from the Commission, falling naturally into the Rideau System group with Smith's Falls, which has been supplied since September 15, 1918. Perth has been taking power since February 18, 1919, and Carleton Place since May 1, 1919.

Perth is provided with three 200 kv-a., single-phase transformers, with modern equipment and building, and is supplied at 26,400 volts from an extension to the Smith's Falls line 26.25 miles in length. The Commission purchased the generating station at Carleton Place, and has been supplying power to this municipality to the full extent of the capacity of the plant. A new transformer station, supplied from a line from the Smith's Falls-Perth line at 26,400 volts will be ready for operation early next year.

Pending the development of High Falls, which will be completed early in 1920, a supply of power was obtained from the Rideau Power Company at Merrickville, which has been utilized since Smith's Falls was connected. Although the power supply available at the Rideau Power Company, amounting to 941 horsepower at present, was not expected to provide for the rapid expansion that will undoubtedly follow the completion of High Falls and which will probably utilize the output of both plants, it has been sufficient for the immediate requirements of the district since all the municipalities on the system have hydro-electric generating plants of their own. The operation of this new system has been very satisfactory.

RIDEAU SYSTEM
PEAKS, 1919

H. E. P. C.
ONTARIO



Rideau System

Power supplied since commencement of operation.

Fiscal Year, 1917-1918	Peak H.P. Supplied
October, 1918.....	439
Fiscal Year, 1918-1919	
November, 1918.....	460
December, ".....	459
January, 1919.....	311
February, ".....	407
March, ".....	474
April, ".....	477
May, ".....	1,149
June, ".....	1,141
July, ".....	1,168
August, ".....	1,297
September, ".....	1,268
October, ".....	1,404

Note; Carleton Place treated as part of the Rideau System since May 1st, 1919.

Rideau System

Municipal Loads, 1918-1919	Peak load in H.P. Oct., 1918	Peak load in H.P. Oct., 1919
Carleton Place.....	—	514
Perth.....	—	342
Smith Falls.....	414	450

Nipissing System

The operation of the Nipissing System, with a main generating plant near Nipissing Village on the South River and auxiliary generating plant, the North Bay Steam Plant, has been satisfactory throughout the year.

Power is supplied from this system to North Bay, Callender, Powassan and Nipissing Village.

The power delivered to the system from the Hydro Plant on the South River is limited to some extent during the low flow periods in the river, but by aid of the steam plant operated in parallel, the supply of power and the service to the customers has been satisfactory.

At the Nipissing plant considerable maintenance work was carried out in altering the supports to the wood stave pipe line and minor maintenance to the dams and surge tank.

The domestic water supply for the operator's cottages was remodelled and improved to a considerable extent.

The lightning arrester equipment on the high-tension lines at Nipissing Power House and North Bay sub-station were remodelled to conform with the latest type of construction and to afford better protection to equipment and service.

The smoke stacks at the steam plant, North Bay, were painted with special paint to aid in reducing the maintenance, on this part of the plant. Also, additional equipment was added at this plant to overcome the defect of sand in the water intake.

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

Detailed Statement of Assets and Liabilities—31st October, 1919

Assets.

NIAGARA SYSTEM:

Right-of-Way	1,459,813 15
Steel Tower Lines	4,124,624 68
Transformer Stations	5,790,870 78
Wood Pole Lines	2,457,978 04

Rural Lines	13,833,286 65
	473,085 85

14,306,372 50

THUNDER BAY SYSTEM:

Power Development (Nipigon River)	621,330 65
Transmission Line (Nipigon River)	199,081 23
Transmission Line (Port Arthur)	28,771 09
Transformer Stations (Port Arthur)	88,910 79

938,093 76

SEVERN SYSTEM:

Power Development	633,889 91
Wood Pole Lines	547,404 11
Distributing Stations	168,339 55

1,349,633 57

ST. LAWRENCE SYSTEM:

Wood Pole Lines	265,541 47
Distributing Stations	247,825 00

513,366 47

WASDELL'S SYSTEM:

Power Development	140,787 40
Wood Pole Lines	110,243 01
Distributing Stations	14,735 64

Rural Lines	265,766 05
	7,698 16

273,464 21

Liabilities.

PROVINCIAL TREASURER:

Cash advances for Niagara and other Systems, less contra accounts	25,517,816 10
Cash advances for Niagara Power Development Works	11,075,000 00

BANK OF MONTREAL:

Cash advances <i>re</i> construction of third pipe line on Ontario Power Company's Property	1,200,000 00
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Debentures issued to cover purchase of Capital Stock
of Ontario Power Company of Niagara Falls ...

7,994,900 00

Debentures issued to cover purchase price of Essex
County System

226,000 00

Debentures issued to cover purchase price of Thorold
System

100,000 00

DEBENTURES ASSUMED:

Line to Brick Companies at Streets- ville	4,997 35
Muskoka Power Development	45,304 06

50,301 41

Central Ontario System—due thereto

1,384,757 47

Accounts payable

95,411 31

Bond Interest Coupons overdue but not
presented

17,200 00

112,611 31

INSURANCE DEPARTMENT:

Outstanding Claims and Awards

120,600 21

Surplus

36,602 71

157,202 92

EUGENIA SYSTEM:			
Power Development	956,769 04		
Wood Pole Lines	544,059 42		
Distributing Stations	161,994 68		
	1,662,823 14		
Rural Lines	1,694 61	1,664,517 75	518,938 34
OTTAWA SYSTEM:			
Meters, etc.		1,009 57	15,031 67
MUSKOKA SYSTEM:			
Power Development	139,189 57		17,621 72
Wood Pole Lines	54,313 44		30,666 21
Transformer Stations	9,633 56		3,991 40
		203,136 57	
RIDEAU SYSTEM:			
Power Development	430,515 67		
Wood Pole Lines	218,717 05		
Transformer Stations	32,234 26	681,466 98	
BONNECHERE RIVER STORAGE SYSTEM:			
Round Lake Dam	20,397 68		
Golden Lake Dam	11,092 81		
Interest on above to 31st December, 1916	2,780 25	34,270 74	
ESSEX COUNTY SYSTEM:			
Purchase Price of System	226,000 00		
Additional Expenditures to date ..	147,721 30		
		373,721 30	
THOROLD SYSTEM:			
Purchase price	100,000 00		
Less: Credit balance on current account	458 44	99,541 56	
NIAGARA POWER DEVELOPMENT WORKS:			
Expenditures to date		14,713,970 19	
BALANCES DUE TO MUNICIPALITIES IN RESPECT OF AMOUNTS PAID BY THEM TO 31ST OCTOBER, 1919, IN EXCESS OF THE COST OF POWER SUPPLIED TO THEM, AS PROVIDED TO BE PAID UNDER SECTION 23, OF THE ACT:			
Niagara System			518,938 34
Eugenia System			15,031 67
Thunder Bay System			17,621 72
Severn System			30,666 21
Rideau System			3,991 40
			586,249 34
RESERVES FOR SINKING FUND:			
Municipalities—			
Niagara Rural Lines			493,407 36
Thunder Bay System (Port Arthur)			36,456 61
Severn System			17,610 42
Wadell's Rural Lines			22,021 45
Eugenia Rural Lines			170 50
Ottawa System			72 41
Bonnechere Storage System			47 65
Monteith Power Development			1,792 60
			1,196 46
			572,775 46
SERVICE AND OFFICE BUILDINGS:			
Service Building			22,770 65
Office Building			28,670 80
RESERVES FOR RENEWALS:			
Contributed by Municipalities:			
Niagara System			1,493,113 46
Niagara Rural Lines (operated by the Commission)			4,273 68
Thunder Bay System			34,200 34
Severn System			141,751 81
St. Lawrence System			46,927 27
Wadell's System			47,143 15
Eugenia System			100,824 32
Muskoka System			19,436 47
Rideau System			5,153 92
			1,892,824 42

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

Detailed Statement of Assets and Liabilities—31st October, 1919—Continued

<i>Assets.</i>		<i>Liabilities.</i>	
MONTEITH POWER DEVELOPMENT	23,753 52	IN RESPECT OF SERVICE AND OFFICE BUILDINGS:	
ELECTRIC RAILWAY CONSTRUCTION:		Service Building	44,625 51
Expenditures to date on purchase of Right-of-Way	54,811 06	Office Building	5,278 48
Surveying, Engineering, etc.	40,773 28		49,903 99
		RESERVES FOR CONTINGENCIES:	
SERVICE BUILDING AND EQUIPMENT, TORONTO	371,989 39	Niagara System	15,762 48
GARAGE BUILDING AND EQUIPMENT, NIAGARA FALLS	14,665 94	Thunder Bay System	2,776 36
EQUIPMENT AND STOREHOUSE AND GARAGE, HAMILTON	8,898 90	Sewern System	5,110 68
POLE YARD AND EQUIPMENT, COBBOURG ..	19,436 75	St. Lawrence System	1,555 24
		Wasdell System	14,277 43
		Eugenia System	19,488 48
		Muskoka System	1,096 18
		Rideau System	207 70
	414,990 98		
OFFICE BUILDING	496,128 49		60,274 55
			18,854 89
OFFICE FURNITURE AND EQUIPMENT:			
At Toronto Office	70,071 76		
At Hamilton Office	887 72		
At Electrical Inspection Offices	3,573 29		47,177 27
Library	3,720 84		
Stationery and Office Supplies	19,625 44		24,668 34
	97,879 05		
AUTOMOBILES AND TRUCKS	163,037 93		
			22,508 93
			8,530 54
			31,039 47
INVENTORIES:			
Construction and Maintenance, tools and equipment	97,917 43		
Construction material and sundry supplies	720,305 79		
Maintenance material and supplies	204,588 84		
	1,022,812 06		
		Contingent Liability—	
		In respect of contracts entered into for works under construction	1,970,831 64

FARM EQUIPMENT, PRODUCE, ETC.:		
Equipment and Supplies	29,481 99	
Improvements to Property	4,446 32	
Live Stock and Produce	23,513 87	
Expenditures on account of 1920		
Crops	2,247 00	
	<u>59,689 18</u>	
Deficit on operations for year ending		
31st October, 1919	53,408 63	113,097 81
SHARES OF CAPITAL STOCK OF ONTARIO		
POWER COMPANY OF NIAGARA FALLS	.....	7,994,900 00
ONTARIO POWER COMPANY OF NIAGARA		
FALLS:		
Expenditures in connection with		
construction of third pipe line..	3,360,441 02	
Less: Current Account	51,240 83	3,309,200 19
		<u>535,694 85</u>
SINKING FUND ON DEPOSIT WITH PROVIN-		
CIAL TREASURER	475,000 00	
Interest accrued to date	60,694 85	
INVESTMENTS:		
Debentures of the Hydro-Electric		
Power Commission purchased		
(issued in connection with the		
purchase of Capital Stock of the		
Ontario Power Company) par value	79,844 50	
115,000.00		
Interest accrued	2,300 00	82,144 50
CASH:		
In banks	246,569 19	
In hands of employees as advances		
on account of expenses	105,511 62	
In bank to pay Bond Interest		
Coupons overdue but not pre-		
sented	17,200 00	369,280 81

HYDRO-ELECTRIC POWER COMMISSION OF ONTARIO

Detailed Statement of Assets and Liabilities—31st October, 1919—Continued.

Assets.

ACCOUNTS RECEIVABLE:

Due by municipalities in respect of construction work and supply sales	323,437 98
Due by municipalities	
In respect of power accounts	529,971 72
Less: Reserve for doubtful accounts	12,857 20
“Sinking Fund and Interest and “Consumers” accounts owing in respect of rural lines	517,114 52
Due by users of water power from Bonnechere Storage System ...	9,438 66
Due by the Provincial Government in respect of sinking fund and interest charges on the Month Power Development	3,745 59
	3,405 54
	<u>857,142 29</u>

BALANCE DUE BY MUNICIPALITIES IN RESPECT OF THE COSTS OF POWER SUPPLIED TO THEM AS PROVIDED TO BE PAID UNDER SECTION 23 OF THE ACT:

Niagara System	141,747 84
Severn System	36,005 13
St. Lawrence System ..	27,130 01
Wasdell's System	39,236 09
Eugenia System	49,755 28
Muskoka System	11,679 90
Rideau System	1,719 27
	<u>307,273 52</u>

1,164,415 81

NET DEFICIT ON RURAL LINES OPERATED BY THE COMMISSION

2,124 89

WORK IN PROGRESS:

Expenditures on account of various
systems chargeable upon com-
pletion to:

Sundry municipalities 5,800 87
Capital construction 12,837 89
Operating and maintenance
expenses 3,382 15

22,020 91
22,351 47

INSURANCE UNEXPIRED

51,081,982 78

Brought forward 51,081,982 78

51,081,982 78

NIAGARA SYSTEM

Reserve for Contingency Account—31st October, 1919

Balance brought forward 31st October, 1918		\$47,237 53
Added during the year 31st October, 1919:		
Amount charged to Municipalities as part of the cost of power delivered to them	\$30,108 99	
Provision against equipment employed in respect of contracts with sundry companies	7,391 01	
Value of miscellaneous material credited to Contingency Reserve and charged to Stores Account. Credited to Contingency in view of it being impossible to properly allocate it	22,097 90	
Interest at 4 per cent. on the monthly balances of the credit of the account	2,156 12	
		<u>61,754 02</u>
		\$108,991 55
Expenditures during the year ending 31st October, 1919	\$70,840 96	
Losses for the year from contracts with sundry companies	19,682 72	
Adjustments for year ending 31st October, 1918	2,705 39	
		<u>93,229 07</u>
Balance carried forward, 31st October, 1919		\$15,762 48

NIAGARA SYSTEM

Reserve for Renewals Account—31st October, 1919

Total provision for Renewals to 31st October, 1918		\$1,285,378 10
Less adjustments	\$3,137 73	
Deduct expenditures to 31st October, 1918	108,685 40	
		<u>111,823 13</u>
Balance brought forward, 31st October, 1919		\$1,173,554 97
Added during the year ending 31st October, 1919:		
Amounts charged to Municipalities as part of the cost of power delivered to them	\$244,577 12	
Provision against equipment employed in respect of contract with sundry companies	49,363 48	
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	46,942 19	
		<u>340,882 79</u>
		\$1,514,437 76
Expenditures during the year ending 31st October, 1919		<u>21,324 30</u>
Balances carried forward, 31st October, 1919		<u>\$1,493,113 46</u>

NIAGARA SYSTEM

Statement showing the amount to be paid by each Municipality as the Cost under Section 23 of the Act, of Power supplied to it by the Commission in the year ending October, 31st 1919—the amount received by the Commission from each Municipality on account of such cost, and the surplus carried to the credit of or the shortage to be made good by each Municipality with overpayment or underpayment for the Power supplied to it in the year ending 31st October, 1919.

NIAGARA

Statement showing the Amount to be paid by each Municipality as the Cost under Section 23 the Amount received by the Commission from each Municipality on account of such cost, and overpayment or underpayment for the Power

Municipality	Interim Rates per Horse Power Collected by Commission during year		Share of Capital Cost of System on which Interest and Fixed Charges are payable for year	Average Horse Power supplied in year after correction for power factor	Cost of Power to Commission	Share of Operating Maintenance and Administrative Expenses
	To Apl. 30, 1919	To Oct. 31, 1919				
			\$ c.		\$ c.	\$ c.
Acton	36.00	35.00	24,923 64	170.2	1,657 31	1,044 31
Ailsa Craig	49.67	49.00	27,607 06	95.5	1,929 92	937 47
Aylmer	39.00	38.00	51,539 63	139.6	1,359 34	1,383 05
Ayr	37.40	45.00	12,667 34	44.7	435 26	571 52
Baden	32.00	32.00	24,018 77	163.3	1,590 12	1,300 30
Beachville	28.00	27.00	28,905 48	221.2	2,153 92	1,247 82
Blenheim	43.70	50.00	40,902 52	124.0	1,207 44	1,497 19
Bolton	43.00	43.00	36,981 28	83.6	814 05	1,174 67
Bothwell	59.26	59.26	45,770 78	106.0	1,032 16	2,027 30
Brampton	22.00	22.00	63,605 56	755.1	7,352 74	3,270 25
Brantford	19.00	18.00	190,636 99	2,756.4	26,840 29	9,185 01
Brigden	57.56	57.50	33,761 07	71.5	696 22	1,488 30
Burford	37.50	60.00	15,955 90	39.1	380 73	805 75
Burgessville	48.38	48.00	6,355 59	22.2	216 17	264 34
Caledonia	24.00	24.00	5,504 26	48.6	473 24	221 54
Chatham	30.78	29.00	211,229 11	1,342.8	13,075 44	8,336 25
Clinton	42.00	43.00	40,404 92	144.2	1,404 14	1,167 13
Comber	56.22	60.00	16,954 84	22.8	222 01	570 92
Chippawa			974 56	4.2	50 40	179 21
Dashwood	56.75	56.00	21,324 39	46.9	456 68	519 33
Delaware	46.56	50.00	4,430 79	8.4	81 79	317 48
Dereham Twp.		37.00	1,709 07	8.5	82 76	344 75
Dorchester	45.00	50.00	4,548 73	18.3	178 19	174 79
Drayton	60.45	60.00	30,093 77	52.	506 34	771 16
Dresden	43.00	42.00	31,776 83	150.1	1,461 59	1,316 50
Drumbo	40.72	45.00	4,397 74	19.8	192 80	205 66
Dublin	47.91	48.00	9,026 92	26.3	256.09	597 91
Dundas	14.00	14.00	52,428 56	1,217.2	11,852 41	3,421 52
Dunnville	27.77	27.77	78,135 17	194.3	1,891 98	1,817 59
Dutton	43.53	43.00	22,309 82	97.6	950 37	987 39
Elmira	38.00	38.00	34,806 50	172.9	1,683 60	1,272 83
Elora	33.97	40.00	41,837 09	194.2	1,891 01	1,200 10
Embro	45.00	60.00	17,851 15	35.1	340 81	541 19
Etobicoke Twp.	27.00	27.00	18,507 98	206.5	2,010 78	1,406 80
Exeter	41.66	41.00	42,422 74	145.7	1,418 74	1,234 28
Fergus	33.97	40.00	30,546 28	127.2	1,238 60	1,009 16
Forest	63.27	63.00	49,742 01	102.2	995 16	1,617 31
Galt	20.00	20.00	212,598 84	2,286.6	22,265 74	8,678 61
Georgetown	36.00	36.00	79,718 28	397.1	3,866 74	2,703 95
Goderich	43.00	43.00	143,748 10	403.4	3,928 08	3,499 40
Granton	48.61	48.00	13,303 55	37.3	363 20	610 50
Guelph	20.00	19.00	185,552 34	2,829.1	27,548 31	9,781 13
Hagersville	33.21	34.00	35,162.22	162.8	1,585 25	862 77
Hamilton	14.00	14.00	570,089 83	13,179.4	128,333 81	27,384 23
Harriston	46.62	48.00	42,506 94	101.2	985 43	1,619 66

SYSTEM

of the Act, of Power supplied to it by the Commission in the year ending October 31, 1919—the surplus carried to the credit of or the shortage to be made good by each Municipality with supplied to it in the year ending 31st October, 1919

Operating Costs & Fixed Charges			Sinking Fund	Total Cost of Power for year as provided to be paid under Section 23 of Act	Total Revenue	Surplus or Shortage between Cost of Power and payment made to Commission in respect thereof in year		Sinking Fund paid for year
Interest	Renewals	Contingencies				Surplus	Shortage	
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	
1,062 99	584 91	40 95	471 33	4,861 80	5,845 01	983 21	.....	1919
1,166 44	652 72	22 98	.....	3,709 53	4,711 89	1,002 36	.....	.....
2,230 21	1,251 14	33 60	.....	6,257 34	5,377 01	.....	880 33	.....
546 97	308 85	10 75	.....	1,873 35	1,734 71	.....	138 64	.....
1,036 95	563 68	39 29	466 37	4,996 71	4,928 25	.....	68 46	1918
1,232 01	670 81	53 23	495 62	5,853 41	6,094 69	241 28	.....	1918
1,735 32	933 63	29 84	.....	5,403 42	5,537 35	133 93	.....	.....
1,599 20	894 22	20 11	.....	4,502 25	3,580 46	.....	921 79	.....
1,951 68	1,068 26	25 51	.....	6,104 91	6,023 74	.....	81 17	.....
2,726 19	1,316 22	181 71	1,019 10	15,866 21	17,924 68	2,058 47	.....	1919
8,141 61	4,282 81	663 31	.....	49,113 03	51 031 75	1,918 72	.....	.....
1,441 58	792 74	17 21	.....	4,436 05	3,949 83	.....	486 22	.....
683 56	389 64	9 41	.....	2,271 09	1,961 11	.....	309 98	.....
275 33	153 69	5 34	.....	912 87	1,069 10	156 23	.....	.....
245 24	137 68	11 69	118 55	1,207 94	1,167 20	.....	40 74	1918
8,751 27	4,317 58	323 14	.....	34,803 68	40,165 68	5,362 00	.....	.....
1,747 26	962 40	34 70	.....	5,315 63	6,127 53	811 90	.....	.....
727 88	407 53	5 49	.....	1,933 83	1,327 94	.....	605 89	.....
7 04	4 06	.....	.....	240 71	147 29	.....	93 42	.....
909 38	514 70	11 29	.....	2,411 38	2,649 14	237 76	.....	.....
189 37	107 48	2 02	.....	698 14	407 57	.....	290 57	.....
71 18	39 53	2 04	.....	540 26	315 42	.....	224 84	.....
191 37	106 54	4 40	.....	655 29	870 49	215 20	.....	.....
1,302 75	735 14	12 51	.....	3,327 90	3,131 09	.....	196 81	.....
1,332 08	686 77	36 12	.....	4,833 06	6,374 87	1,541 81	.....	.....
189 71	106 47	4 76	.....	699 40	794 27	94 87	.....	.....
390 50	216 97	6 32	.....	1,467 79	1,220 49	.....	247 30	.....
2,440 39	1,312 59	292 90	1,013 70	20,333 51	15,774 65	.....	4,558 86	1919
5,379 91	1,949 97	46 76	.....	9,086 21	5,395 68	.....	3,690 53	.....
964 54	931 62	23 49	.....	3,457 41	4,158 18	700 77	.....	.....
1,503 92	831 22	41 60	607 20	5,940 37	6,181 94	241 57	.....	1917
1,793 48	1,002 36	46 73	.....	5,933 68	6,708 96	775 28	.....	.....
770 32	438 09	8 42	.....	2,098 83	1,861 25	.....	237 58	.....
793 78	387 78	49 69	.....	4,648 83	5,575 05	926 22	.....	.....
1,792 73	1,003 41	35 06	.....	5,484 22	5,687 05	202 83	.....	.....
1,310 73	735 13	30 61	.....	4,324 23	4,688 37	364 14	.....	.....
2,124 89	1,170 24	24 60	.....	5,932 20	6,449 81	517 61	.....	.....
9,155 07	4,851 23	550 25	3,802 88	49,303 78	47,315 64	.....	1,988 14	1919
3,414 63	1,903 86	95 56	1,294 97	13,279 35	14,294 40	1,015 05	.....	1917
6,218 96	3,460 25	97 07	.....	17,203 76	17,347 84	144 08	.....	.....
564 84	317 96	8 98	.....	1,865 48	1,804 24	.....	61 24	.....
7,756 92	4,004 02	680 82	3,222 13	52,993 53	55,175 84	2,182 31	.....	1919
1,546 25	879 33	39 17	498 80	5,411 53	5,166 93	.....	244 60	1917
8,528 42	14,272 72	3,171 58	11,019 51	210,710 65	187,192 53	.....	23,518 12	1919
1,839 41	1,029 18	24 35	.....	5,498 00	4,450 26	.....	1,047 74	.....

NIAGARA

Statement showing the Amount to be paid by each Municipality as the Cost under Section 23 Amount Received by the Commission from each Municipality on account of such cost, and the overpayment or underpayment for the Power supplied

Municipality	Interim Rates per Horse Power Collected by Commission during year		Share of Capital Cost of System on which Interest and Fixed Charges are payable for year	Average Horse Power supplied in year after correction for power factor	Cost of Power to Commission	Share of Operating Maintenance and Adminis- trative Expenses
	To April 30, 1919	To Oct. 31, 1919				
			\$ c.		\$ c.	\$ c.
Hensall	47.76	47.00	34,085 95	83.8	815 99	890 75
Hespeler	21.00	21.00	32,001 68	307.8	2,997 18	1,378 07
Highgate	51.82	51.00	21,038 85	52.3	509.26	843 98
Ingersoll	23.00	23.00	83,289 93	864.9	8,421 92	3,735 39
Invalided Soldiers' Comm., Guelph....	24.00	24.00	14,767 80	188.8	1,838 43	563 63
Kitchener	20.00	19.00	367,170 78	4,866.3	47,385 33	16,788 54
Lambeth	46.56	50.00	7,904 40	16.6	161 64	359 89
Listowel	37.41	37.00	69,074 48	326.8	3,182 19	3,332 89
London	21.00	19.00	768,044 59	9,612.2	93,598 28	32,020 86
London Ry. Com. }	.45+ 12.00	Kwh.45 +12.00	136,983 91	948.2	9,233 04	15,053 34
Lucan	47.74	40.00	22,743 78	119.1	1,159 73	922 36
Lynden	33.00	40.00	25,844 72	83.4	812 10	758 00
Milton	28.00	28.00	59,828 94	420.5	4,094 59	2,284 85
Milverton	35.63	35 00	48,319 11	267.2	2,601 84	2,245 59
Mimico	27.00	25.00	17,957 49	200.9	1,956 25	1,060 09
Mimico Asylum and Brickyard	29.00	29.00	16,374 70	166.6	1,622 25	678 51
Mitchell	36.00	36.00	29,989 08	166.2	1,618 36	1,309 58
Moorefield	63.93	63.00	15,288 20	28.	272 65	669 82
Mt. Brydges	46.56	50.00	12,666 11	26.6	259 01	573 40
Niagara-on-the-Lake .....	.....	28.00	4,596 18	40.6	395 34	369 88
Niagara Falls	11.50	11.50	26,506 66	2,717.1	26,457 61	924 69
New Hamburg	32.00	32.00	32,866 80	205.1	1,997 15	1,204 04
New Toronto	27.00	25.00	270,398 76	2,682.4	26,119 72	14,784 70
Norwich	38.00	35.00	27,477 38	184.4	1,795 58	1,378 45
Oil Springs	38.54	38.00	30,553 25	94.	915 32	1,410 69
Ontario Agricultural College	23.00	23.00	10,231 48	140.1	1,364 21	436 32
Otterville	45.00	50.00	7,125 17	22.8	222 01	233 92
Palmerston	40.82	45.00	26,776 33	94.8	923 11	1,232 99
Paris	21.00	20.00	43,609 17	561.2	5,464 65	2,202 70
Petrolia	36.26	36.00	89,580 57	416.4	4,054 67	3,241 93
Plattsville	49.27	60.00	22,943 93	56.3	548 22	784 70
Port Credit	27.00	25.00	6,066 87	65.9	641 69	314 74
Port Stanley	9.00+ Fxd Cgs	From Sep 1/19	35,678 29	121.1	1,179 20	1,529 11
Preston	19.00	19.00	95,602 80	1,121.9	10,924 47	4,279 81
Princeton	65.95	70.00	8,179 99	12.3	119 77	270 75
Ridgetown	47.17	47.00	37,451 68	125.9	1,225 94	1,632 14
Rockwood	38.33	38.00	12,277 82	42.4	412 86	618 11
Rodney	63.00	63.00	18,057 36	46.8	455 71	733 35
St. George	38.78	45.00	17,111 67	78.	759 52	547 00
St. Jacobs	32 44	32.00	11,236 41	60.	584 24	540 15

SYSTEM—Continued

of the Act of Power supplied to it by the Commission in the year ending October 31, 1919—the surplus carried to the credit of or the shortage to be made good by each Municipality with to it in the year ending 31st October, 1919

Operating Costs & Fixed Charges			Sinking Fund	Total Cost of Power for year as provided to be paid under Section 23 of Act	Total Revenue	Surplus or Shortage between Cost of Power and payment made to Commission in respect thereof in year		Sinking Fund paid for year
Interest	Renewals	Contingencies				Surplus	Shortage	
1,450 84	819 27	20 16	.....	3,997 01	3,693 37	.....	303 64	....
1,379 06	737 66	74 07	572 84	7,138 88	6,752 04	.....	386 84	1919
896 03	488 46	12 59	.....	2,750 32	2,687 34	.....	62 98	....
3,528 96	1,879 64	208 13	1,465 88	19,239 92	20,836 49	1,596 57	.....	1919
621 00	326 83	45 43	241 88	3,637 20	4,530 40	893 20	.....	1917
15,788 31	8,083 01	1,171 04	6,5588 23	95,774 46	95,862 44	87 98	.....	1919
337 34	191 10	3 99	.....	1,053 96	803 01	.....	250 95	....
2,985 05	1,618 75	78 64	.....	11,197 52	11,984 79	787 27	.....	.....
30,274 37	15,429 08	2,313 11	12,575 52	186,211 22	191,769 62	5,558 40	.....	1919
5,914 42	3,170 87	228 18	.....	33,599 85	20,268 25	.....	13,331 60	....
948 31	521 87	28 67	.....	3,580 94	5,243 70	1,662 76	.....	.....
1,131 35	646 18	20 07	.....	3,367 70	3,045 74	.....	321 96	....
2,575 84	1,343 19	101 19	943 97	11,343 63	11,109 46	.....	234 17	1917
2,087 09	1,119 55	64 30	.....	8,118 37	9,101 90	983 53	.....	.....
770 17	376 06	48 34	292 34	4,503 25	5,217 03	713 78	.....	1918
702 91	348 92	40 08	302 63	3,695 30	4,602 88	907 58	.....	1917
1,295 33	694 71	39 99	538 06	5,496 03	5,982 60	486 57	.....	1919
661 82	372 96	6 74	.....	1,983 99	1,780 92	.....	203 07	....
540 55	306 22	6 40	.....	1,685 58	1,283 39	.....	402 19	....
198 44	114 48	9 77	.....	1,087 91	1,135 63	47 72	.....	.....
1,101 49	635 48	653 85	.....	29,773 12	31,246 67	1,473 55	.....	.....
1,419 08	775 47	49 35	589 46	6,034 55	6,099 46	64 91	.....	.....
11,610 49	5,786 88	645 52	.....	58,947 31	69,655 09	10,707 78	.....	1919
1,173 57	643 74	44 37	505 69	5,541 40	6,731 11	1,189 71	.....	1918
1,195 03	638 26	22 62	.....	4,181 92	3,475 61	.....	706 31	....
429 31	224 34	33 71	178 33	2,666 22	3,222 67	556 45	.....	1919
306 63	172 78	5 49	.....	940 83	1,056 87	116 04	.....	.....
1,157 89	638 03	22 81	.....	3,974 83	4,076 10	101 27	.....	.....
1,865 44	991 87	135 05	.....	10,659 71	11,680 52	1,020 81	.....	.....
3,757 21	1,940 86	100 20	.....	13,094 87	15,043 95	1,949 08	.....	.....
991 80	563 73	13 54	.....	2,901 99	3,197 07	295 08	.....	.....
260 24	127 75	15 86	99 79	1,460 07	1,712 18	252 11	.....	1918
1,502 71	836 13	29 14	618 84	5,695 13	5,246 55	.....	448 58	1918
4,114 55	2,162 54	269 97	1,709 12	23,460 46	21,381 63	.....	2,078 83	1919
353 93	202 35	2 96	.....	949 76	741 69	.....	208 07	....
1,585 21	845 99	30 30	.....	5,319 58	5,852 15	532 57	.....	.....
527 79	297 44	10 20	168 49	2,034 89	1,521 87	.....	513 02	1917
781 43	438 92	11 26	.....	2,420 67	2,949 14	528 47	.....	.....
738 10	414 11	18 77	.....	2,477 50	2,567 30	89 80	.....	.....
485 42	267 41	14 44	.....	1,891 66	1,929 20	37 54	.....	.....

NIAGARA

Statement showing the Amount to be Paid by each Municipality as the Cost under Section 23 the Amount received by the Commission from each Municipality on account of such cost, with overpayment or underpayment for the Power

Municipality	Interim Rates per Horse Power Collected by Commission during year		Share of Capital Cost of System on which Interest and Fixed Charges are payable for year	Average Horse Power supplied in year after correction for power factor	Cost of Power to Commission	Share of Operating, Maintenance and Administrative Expenses
	To April 30, 1919	To Oct. 31, 1919				
St. Mary's	28.00	28.00	\$ 72,370 80	\$ c. 475.4	\$ c. 4,629 18	\$ c. 3,339 97
St. Thomas	26.00	24.00	221,405 49	2,167.7	21,107 86	13,778 99
Sarnia	38.00	38.00	446,007 85	1,932.5	18,817 61	14,710 02
Seaforth	38.00	38.00	71,895 78	344.3	3,352 60	2,360 30
Simcoe	35.00	32.00	18,954 81	148.2	1,443 09	678 88
Springfield	65.00	65.00	11,222 39	24.8	241 49	534 19
Stamford Twp.	16.57	15.00	7,100 68	354.6	3,452 90	1,730 19
Stratford	27.00	25.00	172,850 98	1,462.3	14,239 07	8,041 06
Strathroy	44.07	42.00	72,363 41	272.7	2,655 40	1,446 11
Tavistock	37.01	36.00	51,344 39	263.4	2,564 84	2,157 52
Thamesford	45.00	50.00	21,901 77	78.8	767 31	825 52
Thamesville	45.40	50.00	16,601 33	47.2	459 60	755 32
Thorndale	45.00	50.00	18,259 68	57.1	556 00	694 74
Tilbury	39.45	45.00	28,753 59	80.6	784 83	1,012 16
Tillsonburg	35.00	32.00	94,905 08	706.1	6,875 61	4,229 64
Toronto	14.50	14.50	3,147,979 35	48,480.6	472,077 37	81,933 61
Toronto Twp.	25.00	25.00	17,737 15	158.6	1,544 35	1,200 63
Walkerville	38.00	36.00	492,884 32	2,129.1	20,731 99	17,476 40
Wallaceburg	38.45	38.00	136,867 84	615.8	5,996 31	5,506 37
Waterdown	26.00	26.00	14,192 27	88.4	860 79	64 60
Waterford	39.00	39.00	17,369 72	120.2	1,170 44	838 72
Waterloo	21.00	20.00	78,357 89	988.6	9,626 44	3,601 93
Watford	59.45	65.00	40,833 67	49.8	484 92	1,294 47
Welland	14.00	14.00	128,061 67	3,257.5	31,719 72	2,888 93
Wellesley	39.96	39.00	28,744 39	113.4	1,104 22	889 33
West Lorne	55.60	55.00	8,810 79	28.4	276 54	378 19
Weston	From Jan. 1, '19	25.00	75,667 62	812.	7,906 80	3,112 51
Windsor	30.00	36.00				
Woodbridge	38.00	36.00	491,043 14	2,123.9	20,681 36	17,399 07
Woodstock	33.83	33.00	23,964 42	139.5	1,358 37	1,170 16
Wyoming	21.00	20.00	87,054 76	1,256.9	12,238 99	5,033 08
Zurich	38.34	38.00	12,586 62	27.1	263 88	565 88
Breslau District....	69.34	69.00	29,540 46	55.5	540 42	601 29
Petersburg and St. Agatha	Kwh. at 3-9/10	12.00	25,827 36	28.1	273 62	635 38
Totals-Municipalities			11,472,589 42		1,218,387 04	436,659 42
Totals-Companies			2,152,642 92		299,070 53	69,255 18
Grand Total			13,625,232 34		1,517,457 57	505,914 60

SYSTEM—Continued

of the Act of Power supplied to it by the Commission in the year ending October 31, 1919—
and the Surplus carried to the credit of or the shortage to be made good by each Municipality
supplied to it in the year ending 31st October, 1919

Operating Costs & Fixed Charges			Sinking Fund	Total Cost of Power for year as pro- vided to be paid under Section 23 of Act	Total Revenue	Surplus or Shortage between Cost of Power and Payment made to Commission in respect thereof in year		Sinking Fund paid for year
Interest	Renewals	Contingencies				Surplus	Shortage	
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	
3,124 10	1,584 34	114 40	1,297 70	14,089 69	13,310 44	.....	779 25	1919
9,544 98	4,955 06	521 64	3,964 84	53,873 37	54,464 93	591 56	.....	1919
18,748 52	9,764 13	465 05	.....	62,505 33	73,434 35	10,929 02	.....	.....
3,106 83	1,683 46	82 85	1,290 53	11,876 57	13,083 39	1,206 82	.....	1919
814 96	447 91	35 66	.....	3,420 50	4,961 16	1,540 66	.....	.....
505 79	287 32	5 97	.....	1,574 76	1,431 05	.....	143 71	.....
301 56	173 98	85 33	.....	5,743 96	5,536 94	.....	207 02	.....
7,453 42	3,837 36	351 89	3,096 04	37,018 84	38,070 34	1,051 50	.....	1919
3,039 24	1,695 64	65 62	.....	8,902 01	11,872 73	2,970 72	.....	.....
2,218 31	1,196 46	63 38	.....	8,200 51	9,619 67	1,419 16	.....	.....
924 41	516 62	18 96	.....	3,052 82	3,751 85	699 03	.....	.....
705 27	381 19	11 36	.....	2,312 74	2,257 53	.....	55 21	.....
773 24	434 01	13 74	.....	2,471 73	2,710 76	239 03	.....	.....
1,221 84	661 02	19 40	.....	3,699 25	3,265 28	.....	433 97	.....
4,047 03	2,207 24	169 92	1,681 07	19,210 51	22,432 84	3,222 33	.....	1919
135,724 30	57,936 65	11,666 64	46,960 91	806,299 48	699,444 97	.....	106,854 51	1919
762 37	385 92	38 16	162 65	4,094 08	3,897 08	.....	197 00	1917
21,225 04	10,221 24	512 35	.....	70,167 02	79,523 58	9,356 56	.....	.....
5,746 63	2,980 03	148 19	.....	20,377 53	23,541 22	3,163 69	.....	.....
627 23	354 94	21 27	260 54	2,689 37	2,298 43	.....	390 94	1919
747 49	413 19	28 93	.....	3,198 77	4,216 20	1,017 43	.....	.....
3,370 63	1,736 24	237 90	1,400 11	19,973 25	20,403 28	430 03	.....	1919
1,754 58	985 14	11 98	.....	4,531 09	2,857 42	.....	1,673 67	.....
5,449 31	3,143 87	783 90	.....	43,985 73	46,087 23	2,101 50	.....	.....
1,242 73	693 06	27 29	.....	3,956 63	4,477 83	521 20	.....	.....
381 16	212 67	6 83	.....	1,255 39	1,570 63	315 24	.....	.....
3,246 64	1,597 12	195 40	1,226 76	17,285 23	20,300 25	3,015 02	.....	1919
21,145 55	10,180 32	511 11	.....	69,917 41	78,734 22	8,816 81	.....	.....
1,032 90	548 50	33 57	.....	4,143 50	4,532 30	388 80	.....	.....
3,655 73	1,881 94	302 46	1,518 54	24,630 74	25,749 12	1,118 38	.....	1919
537 34	295 25	6 52	.....	1,668 87	1,033 03	.....	635 84	.....
1,262 73	716 74	13 35	.....	3,134 53	3,839 61	705 08	.....	.....
1,118 47	639 99	6 76	432 32	3,106 54	1,731 45	.....	1,375 09	1918
612 58	348 55	5 55	161 48	1,919 22	1,294 87	.....	624 35	1918
491,401 74	244,577 12	30,108 99	114,844 72	2,535,979 03	472,510 99	109,287 70	172,755 74	.....
92,332 46	49,363 48	7,391 01	36,401 34	553,814 00	534,131 28	14,055 08	33,737 80	.....
583,734 20	293,940 60	37,500 00	151,246 06	3,089,793 03	3,006,642 27	123,342 78	206,493 54	.....

NIAGARA

Statement Showing the Total Sinking Fund Requirements of each Municipality. Sinking Fund of the Act. Sinking Fund Payments made by Certain Municipalities who have been Interest Allowed thereon

Municipality	Sinking Fund Requirements	
	Period Covered	Amounts
		\$ c.
Acton	1917 to 1919 inclusive	1,303 40
Ailsa Craig	" " "	1,287 14
Aylmer	1918 to 1919 "	1,476 92
Ayr	1917 to 1919 "	677 41
Baden	" " "	1,399 21
Beachville	" " "	1,402 13
Blenheim	" " "	2,033 48
Bolton	" " "	2,061 68
Bothwell	" " "	2,085 95
Brampton	" " "	3,286 20
Brantford	" " "	8,944 79
Brigden	1917 to 1919 "	1,000 53
Burford	1918 to 1919 "	852 45
Burgessville	" " "	295 74
Caledonia	" " "	325 46
Chatham	" " "	10,269 86
Chippawa	" 1919 "	2 92
Clinton	1917 to 1919 "	1,915 23
Comber	" " "	974 69
Dashwood	" " "	978 16
Delaware	" " "	221 72
Dereham Twp.	" 1919 "	29 57
Dorchester	1917 to 1919 "	228 04
Drayton	1918 to 1919 "	918 98
Dresden	1917 to 1919 "	1,335 88
Drumbo	" " "	311 35
Dublin	" " "	339 08
Dundas	" " "	3,041 04
Dunnville	1918 to 1919 "	1,966 69
Dutton	1917 to 1919 "	998 76
Elmira	" " "	1,808 09
Elora	" " "	2,054 40
Embro	" " "	968 40
Etobicoke Twp.	" " "	566 44
Exeter	" " "	4,082 31
Fergus	" " "	1,595 70
Forest	" " "	2,423 39
Galt	" " "	10,461 22
Georgetown	" " "	4,010 25
Goderich	" " "	6,616 79
Granton	" " "	667 88
Guelph	" " "	9,345 92
Hagersville	" " "	1,673 19
Hamilton	" " "	25,276 30
Harriston	" " "	2,195 11

SYSTEM

Requirements, the Payments of which, have been Deferred by the Commission under Section 23 Operating more than Five Years and the Total of the Sinking Fund Payments including to October 31, 1919

Sinking Fund Requirements Payment Deferred		Sinking Fund Charged or Paid		Interest at 4% per annum allowed on Sinking Fund Payments	Total Sinking Fund Pay- ments and accumulated Interest to Oct- ober 31, 1919
Period Covered	Amounts	Period Covered	Amounts		
	\$ c.		\$ c.	\$ c.	\$ c.
1919	441 55	1917 and 1918	861 85	15 62	877 47
1917 to 1919	1,287 14				
1918 and 1919	1,476 92				
1917 to 1919	677 41				
1919	430 73	1917 and 1918	968 48	20 08	988 56
1919	511 76	" "	890 37	15 79	906 16
1917 to 1919	2,033 48				
" "	2,061 68				
" "	2,085 95				
		1917 to 1919	3,286 20	136 25	3,422 45
1917 to 1919	8,944 79				
1918 to 1919	1,000 53				
1917 to 1919	852 45				
" "	295 74				
1919	101 87	1917 and 1918	223 59	4 20	227 79
1917 to 1919	10,269 86				
1919	2 92				
1917 to 1919	1,915 23				
" "	974 69				
" "	978 16				
" "	221 72				
1919	29 57				
1917 to 1919	228 04				
1918 to 1919	918 98				
1917 to 1919	1,335 88				
1917 to 1919	311 35				
" "	339 08				
		1917 to 1919	3,041 04	114 83	3,155 87
1918 to 1919	1,966 69				
1917 to 1919	998 76				
1918 to 1919	1,200 89	1917	607 20		607 20
1917 to 1919	2,054 40				
" "	968 40				
" "	566 44				
" "	4,082 31				
" "	1,595 70				
" "	2,423 39				
		1917 to 1919	10,461 22	391 67	10,852 89
1918 to 1919	2,715 28		1,294 97		1,294 97
1917 to 1919	6,616 79				
" "	667 88				
		1917 to 1919	9,345 92	365 99	9,711 91
1918 to 1919	1,174 39	1917	498 80		498 80
		1917 to 1919	25,276 30	840 65	26,116 95
1917 to 1919	2,195 11				

NIAGARA

Statement Showing the Total Sinking Fund Requirements of each Municipality. Sinking Fund of the Act. Sinking Fund Payments made by Certain Municipalities who have been Interest Allowed thereon

Municipality	Sinking Fund Requirements	
	Period Covered	Amounts
		\$ c.
Hensall	1917 to 1919 Inclusive	1,833 95
Hespeler	" " "	1,635 89
Highgate	" " "	1,006 72
Ingersoll	" " "	4,255 49
Invalided Soldiers' Commission	" " "	731 83
Kitchener	" " "	17,020 38
Lambeth	" " "	440 08
Listowel	" " "	2,955 94
London	" " "	35,365 79
London Railway Com.	" " "	7,755 71
Lucan	" " "	1,287 63
Lynden	" " "	1,364 46
Milton	" " "	2,864 74
Milverton	" " "	2,121 39
Mimico	" " "	863 22
Mimico Asylum and Brickyard	1917 to 1919 inclusive	939 67
Mitchell	" " "	1,552 39
Moorefield	1918 to 1919 "	449 84
Mount Brydges	1917 to 1919 "	666 36
New Hamburg	" " "	1,632 98
New Toronto	" " "	9,533 48
Niagara-on-the-Lake	1919 "	82 43
Niagara Falls	1917 to 1919 "	1,098 96
Norwich	" " "	1,587 75
Oil Springs	1918 to 1919 "	772 12
Ontario Agricultural College	1917 to 1919 "	526 81
Otterville	" " "	315 22
Palmerston	" " "	1,645 04
Paris	" " "	1,795 73
Petrolia	" " "	4,628 37
Plattsville	" " "	1,371 43
Port Credit	" " "	293 85
Port Stanley	" " "	1,885 18
Preston	" " "	4,279 38
Princeton	" " "	511 69
Ridgetown	" " "	2,109 23
Rockwood	" " "	604 39
Rodney	" " "	831 17
St. George	" " "	755 01
St. Jacobs	" " "	485 24
St. Mary's	" " "	3,540 31
St. Thomas	" " "	11,188 62
Sarnia	" " "	19,424 05
Seaforth	" " "	4,817 96
Simcoe	" " "	929 26

SYSTEM—Continued

Requirements, the Payments of which, have been deferred by the Commission under Section 25 Operating more than Five Years and the Total of the Sinking Fund Payments including to October 31, 1919

Sinking Fund Requirements Payment Deferred		Sinking Fund-Charged or Paid		Interest at 4% per annum allowed on Sinking Fund Payments	Total Sinking Fund Pay- ments and accumulated Interest to Oct- ober 31, 1919
Period Covered	Amounts	Period Covered	Amounts		
	\$ c.		\$ c.	\$ c.	\$ c.
1917 to 1919	1,833 95	1917 to 1919	1,635 89	64 26	1,700 15
1917 to 1919	1,006 72	1917 to 1919	4,255 49	170 94	4,426 43
1918 to 1919	489 95	1917	241 88		241 88
		1917 to 1919	17,020 38	629 39	17,649 77
1917 to 1919	440 08				
" "	2,955 94	1917 to 1919	35,365 79	1,393 36	36,759 15
1917 to 1919	7,755 71				
" "	1,287 63				
" "	1,364 46				
1918 to 1919	1,920 77	1917	943 97		943 97
1917 to 1919	2,121 39	1917 and 1918	573 45	11 24	584 69
1919	289 77				
1918 to 1919	637 04	1917	302 63		302 63
		1917 to 1919	1,552 39	62 49	1,614 88
1918 to 1919	449 84				
1917 to 1919	666 36	1917 to 1919	1,632 98	63 00	1,695 98
1917 to 1919	9,533 48				
1919	82 43				
1917 to 1919	1,098 96	1917 and 1918	1,100 27	23 78	1,124 05
1919	487 48				
1918 to 1919	772 12				
		1917 to 1919	526 81	21 44	548 25
1917 to 1919	315 22				
" "	1,645 04				
" "	1,795 73				
" "	4,628 37				
" "	1,371 43				
1919	98 21	1917 and 1918	195 64	3 83	199 47
1919	624 20	" "	1,260 98	25 69	1,286 67
		1917 to 1919	4,279 32	156 37	4,435 69
1917 to 1919	511 69				
" "	2,109 23				
1918 to 1919	436 35	1917	168 49		168 49
1917 to 1919	831 39				
" "	755 17				
" "	485 01				
		1917 to 1919	3,540 31	135 74	3,676 05
		" "	11,188 62	439 87	11,628 49
1917 to 1919	19,424 05	1917 to 1919	4,817 96	209 29	5,027 25
1917 to 1919	929 26				

NIAGARA

Statement Showing the Total Sinking Fund Requirements of each Municipality. Sinking Fund of the Act. Sinking Fund Payments made by Certain Municipalities who have been Interest Allowed thereon

Municipality	Sinking Fund Requirements	
	Period Covered	Amounts
		\$ c.
Springfield	1917 to 1919 Inclusive	422 99
Stamford Twp.	" " "	369 80
Stratford	" " "	9,323 83
Strathroy	" " "	3,756 73
Tavistock	" " "	2,137 93
Thamesford	" " "	987 89
Thamesville	" " "	955 13
Thorndale	" " "	1,344 56
Tilbury	" " "	1,515 61
Tillsonburg	" " "	4,073 91
Toronto	" " "	131,099 00
Toronto Twp.	" " "	674 65
Walkerville	" " "	33,268 82
Wallaceburg	" " "	6,171 36
Waterdown	" " "	727 57
Waterford	" " "	994 00
Waterloo	" " "	3,767 86
Watford	" " "	1,635 16
Welland	" " "	5,981 58
Wellesley	" " "	1,460 16
West Lorne	" " "	507 92
Weston	" " "	3,461 02
Windsor	" " "	27,494 36
Woodbridge	" " "	1,053 92
Woodstock	" " "	4,459 95
Wyoming	" " "	784 91
Zurich	" " "	1,233 35
Breslau:		
As Rural Customer	1914 to 1917 inclusive	1,401 36
As Municipality	1918 to 1919 "	896 92
Petersburg and St. Agatha:		
As Rural Customer	1916 to 1917 "	294 53
As Municipality	1918 to 1919 "	415 94
Companies in Niagara System		540,140 25
		162,475 02
Totals		702,615 27

SYSTEM—Concluded

Requirements, the Payments of which have been Deferred by the Commission under Section 23 Operating more than Five Years and the Total of the Sinking Fund Payments including to October 31, 1919

Sinking Fund Requirements Payment Deferred		Sinking Fund Charged or Paid		Interest at 4% per annum allowed on Sinking Fund Payments	Total Sinking Fund Pay- ments and accumulated Interest to Oct- ober 31, 1919
Period Covered	Amounts	Period Covered	Amounts		
	\$ c.		\$ c.	\$ c.	\$ c.
1917 to 1919					
“ “	422 99				
“ “	369 80				
1917 to 1919	3,756 73	1917 to 1919	9,323 83	387 38	9,711 21
“ “	2,137 93				
“ “	987 89				
“ “	955 13				
“ “	1,344 56				
“ “	1,515 61				
		1917 to 1919	4,073 91	139 56	4,213 47
		“ “	131,099 00	4,746 22	135,845 22
1918 to 1919	512 00	1917	126 65		162 65
1917 to 1919	33,268 82				
“ “	6,171 36				
		1917 to 1919	727 57	27 91	755 48
1917 to 1919	994 00				
		1917 to 1919	3,767 86	144 71	3,912 57
1917 to 1919	1,635 16				
“ “	5,981 58				
“ “	1,460 16				
“ “	507 92				
		1917 to 1919	3,461 02	130 91	3,591 93
1917 to 1919	27,494 36				
“ “	1,053 92				
		1917 to 1919	4,459 95	180 66	4,640 61
1917 to 1919	784 91				
“ “	1,233 35				
		1914 to 1917	1,401 36	233 03	1,634 39
1919	464 60	1918	432 32		432 32
		1916 to 1917	294,53	31 20	325 73
1919	254 46	1918	161 48		161 48
	233,415 58		306,724 67	11,337 35	318,062 02
	1,821 08		160 653 94	14,691 40	175,345 34
	235,236 66		467,378 61	26,028 75	493,407 36

NIAGARA

Statement Showing the Surplus or Shortage of each Municipality at 31st October, 1918, the
Shortage for the Year Ending 31st October, 1919 and

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918	
		Surplus	Shortage
		\$ c.	\$ c.
Acton	Jan., 1913	1,052 74	
Ailsa Craig	Jan., 1916	208 32	
Aylmer	Mar., 1918	285 24	
Ayr	Jan., 1915		1,781 38
Baden	May, 1912	2,247 32	
Beachville	Aug., 1912	4,543 43	
Blenheim	Nov., 1915		3,234 79
Bolton	Feb., 1915		3,715 53
Bothwell	Sept., 1915		3,755 74
Brampton	Nov., 1911	14,291 31	
Brantford	Feb., 1914	6,737 73	
Brigden	Jan., 1918		862 20
Burford	June, 1915		2,743 16
Burgessville	Nov., 1916	543 16	
Caledonia	Oct., 1912	327 67	
Chatham	Feb., 1915		3,549 51
Clinton	Mar., 1914		1,834 52
Comber	May, 1915		3,711 97
Chippawa	Sept., 1919		
Dashwood	Sept., 1917		438 44
Delaware	Mar., 1915		140 15
Dereham Twp.	Sept., 1919		
Dorchester	Dec., 1914	420 47	
Drayton	Mar., 1918		301 59
Dresden	April, 1915		2,094 37
Drumbo	Dec., 1914		1,008 33
Dublin	Oct., 1917		142 87
Dundas	Jan., 1910	3,368 26	
Dunnville	June, 1918		2,979 29
Dutton	Sept., 1915		745 61
Elmira	Nov., 1913	109 84	
Elora	Nov., 1914		2,723 31
Embro	Jan., 1915		3,440 60
Etobicoke Twp.	Aug., 1917	1,112 63	
Exeter	June, 1916		10,008 04
Fergus	Nov., 1914		1,921 10
Forest	Mar., 1917		844 83
Galt	May, 1911	29,027 77	
Georgetown	Sept., 1913		1,875 43
Goderich	Feb., 1914		13,175 50
Granton	July, 1916		275 43
Guelph	Dec., 1910	22,965 44	
Hagersville	Sept., 1913		3,533 94
Hamilton	Feb., 1911	23,208 79	
Harriston	July, 1916		3,248 69
Hensall	Jan, 1917		3,096 44
Hespeler	Feb., 1911	5,486 91	

SYSTEM

Shortages Paid, Adjustments Made and Interest Added during the Year, also the Surplus or the Net Surplus or Shortage at 31st October, 1919.

Shortages Paid and Adjust- ments Made during the year	Interest on Surplus or Shortage at 4% per annum Added during the Year		Surplus or Shortage for the Year Ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
	Credited	Charged	Surplus	Shortage	Surplus	Shortage
\$ c. 359 33	\$ c. 42 11	\$ c.	\$ c. 983 21	\$ c.	\$ c. 2,437 39	\$ c.
.....	8 33	.....	1,002 36	.....	1,219 01	.....
.....	11 41	.....	.....	880 33	.....	583 68
.....	.....	71 26	.....	138 64	.....	1,991 28
.....	89 89	.....	.....	68 46	2,268 75	.....
.....	181 74	.....	241 28	.....	4,966 45	.....
.....	.....	129 39	133 93	.....	.....	3,230 25
.....	.....	148 62	.....	921 79	.....	4,785 94
.....	.....	150 23	.....	81 17	.....	3,987 14
.....	571 65	.....	2,058 47	.....	16,921 43	.....
.....	269 51	.....	1,918 72	.....	8,925 96	.....
.....	.....	34 49	.....	486 22	.....	1,382 91
.....	.....	109 73	.....	309 98	.....	3,162 87
.....	21 73	.....	156 23	.....	721 12	.....
.....	13 11	.....	.....	40 74	300 04	.....
.....	.....	141 98	5,362 00	.....	1,670 51	.....
.....	.....	73 38	811 90	.....	.....	1,096 00
.....	.....	148 48	.....	605 89	.....	4,446 34
.....	.....	.....	.....	93 42	.....	93 42
447 39	36	.....	237 76	.....	247 07	.....
.....	.....	5 61	.....	290 57	.....	436 33
.....	.....	.....	.....	224 84	.....	224 84
.....	16 82	.....	215 20	.....	652 49	.....
.....	.....	12 06	.....	196 81	.....	510 46
.....	.....	83 77	1,541 81	.....	.....	636 33
.....	.....	40 33	94 87	.....	.....	953 79
.....	.....	5 71	.....	247 30	.....	395 88
.....	134 73	.....	.....	4,558 86	.....	1,055 87
.....	.....	119 17	.....	3,690 53	.....	6,788 99
.....	.....	29 82	700 77	.....	.....	74 66
.....	4 39	.....	241 57	.....	355 80	.....
1,000 00	.....	107 39	775 28	.....	.....	1,055 42
.....	.....	137 62	.....	237 58	.....	3,815 80
.....	44 51	.....	926 22	.....	2,083 36	.....
7,020 86	.....	119 49	202 83	.....	.....	2,903 84
.....	.....	76 84	364 14	.....	.....	1,633 80
.....	.....	33 79	517 61	.....	.....	361 01
.....	1,161 11	.....	.....	1,988 14	28,200 74	.....
2,865 00	.....	75 01	1,015 05	.....	1,929 61	.....
3,175 50	.....	480 55	144 08	.....	.....	10,336 47
.....	.....	11 02	.....	61 24	.....	347 69
.....	918 62	.....	2,182 31	.....	26,066 37	.....
2,559 40	.....	141 36	.....	244 60	.....	1,360 50
.....	928 35	.....	.....	23,518 12	619 02	.....
.....	.....	129 95	.....	1,047 74	.....	4,426 38
1,833 46	.....	49 44	.....	303 64	.....	1,589 06
.....	219 47	.....	.....	386 84	5,319 54	.....

NIAGARA

Statement Showing the Surplus or Shortage of each Municipality at 31st October, 1918, the Shortage for the Year Ending 31st October, 1919 and

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918	
		Surplus	Shortage
		\$ c.	\$ c.
Highgate	Dec., 1916	.....	511 44
Ingersoll	May, 1911	10,246 39	.....
Invalided Soldiers' Comm.	Sept., 1913	5,552 58	.....
Kitchener	Jan., 1911	26,783 29	.....
Lambeth	April, 1915	.....	598 99
Listowel	June, 1916	.....	280 85
London	Jan., 1911	96,900 30	.....
London Railway Com.	Aug., 1914	.....	9,609 15
Lucan	Feb., 1915	903 00	.....
Lynden	Nov., 1915	.....	2,772 66
Milton	April, 1913	.....	3,367 18
Milverton	June, 1916	.....	6 02
Mimico	May, 1912	2,473 16	.....
Mimico Asylum and Brickyard	Sept., 1913	2,276 07	.....
Mitchell	Sept., 1911	1,175 31	.....
Moorefield	Mar., 1918	.....	87 62
Mount Brydges	Mar., 1915	.....	486 36
Niagara-on-the-Lake	Aug., 1919	.....	.....
Niagara Falls	Dec., 1915	5,580 08	.....
New Hamburg	Mar., 1911	.....	2,230 84
New Toronto	Feb., 1914	18,208 52	.....
Norwich	May 1912	782 63	.....
Oil Springs	Feb., 1918	184 15	.....
Ontario Agric. College	Nov., 1911	6,092 15	.....
Otterville	Feb., 1916	6 51	.....
Palmerston	July 1916	.....	1,874 09
Paris	Feb., 1914	2,194 95	.....
Petrolia	May 1916	.....	4,477 57
Plattsville	Dec., 1914	.....	4,447 69
Port Credit	Aug., 1912	1,444 12	.....
Port Stanley	Apr. 1912	.....	1,075 63
Preston	Jan., 1911	17,300 67	.....
Princeton	Jan., 1915	.....	1,269 77
Ridgetown	Dec., 1915	.....	981 53
Rockwood	Sep., 1913	.....	1,680 78
Rodney	Feb., 1917	.....	223 35
St. George	Sep., 1915	.....	814 94
St. Jacobs	Sep., 1917	112 66	.....
St. Mary's	May 1911	.....	9,484 16
St. Thomas	Apr., 1911	23,198 63	.....
Sarnia	Dec., 1916	.....	4,434 37
Seaforth	Nov. 1911	6,489 78	.....
Simcoe	Apr., 1915	1,863 86	.....
Springfield	Aug., 1917	463 14	.....
Stamford	Nov., 1916	3,617 44	.....
Stratford	Jan., 1911	23,413 16	.....
Strathroy	Dec., 1914	5,474 69	.....

SYSTEM

Shortages Paid, Adjustments Made and Interest Added during the Year, also the Surplus or the Net Surplus or Shortage at 31st October, 1919.

Shortages Paid and Adjust- ments Made during the year	Interest on Surplus or Shortage at 4% per annum Added during the Year		Surplus or Shortage for the Year Ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
	Credited	Charged	Surplus	Shortage	Surplus	Shortage
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
.....	.....	20 46	.....	62 98	.....	594 88
.....	409 86	.....	1,596 57	.....	12,252 82	.....
790 19	222 10	.....	893 20	.....	7,458 07	.....
.....	1,071 33	.....	87 98	.....	27,942 60	.....
.....	23 96	.....	250 95	.....	873 90	.....
280 85	9 12	.....	787 27	.....	778 15	.....
.....	3,876 01	.....	5,558 40	.....	106,334 71	.....
.....	384 36	.....	13,331 60	.....	23,325 11	.....
.....	36 12	.....	1,662 76	.....	2,601 88	.....
.....	110 90	.....	321 96	.....	3,205 52	.....
3,073 07	134 69	.....	234 17	.....	662 97	.....
.....	24	.....	983 53	.....	977 27	.....
.....	98 94	.....	713 78	.....	3,286 33	.....
4,364 93	91 04	.....	907 58	.....	7,639 62	.....
.....	47 01	.....	486 57	.....	1,708 89	.....
87 62	2 10	.....	203 07	.....	205 17	.....
486 36	14 59	.....	402 19	.....	416 78	.....
.....	.....	47 72	.....	47 72	.....	.....
.....	223 20	.....	1,473 55	.....	7,276 83	.....
.....	89 23	.....	64 91	.....	2,255 16	.....
.....	728 34	.....	10,707 78	.....	29,644 64	.....
.....	31 31	.....	1,189 71	.....	2,003 65	.....
.....	7 37	.....	706 31	.....	514 79	.....
.....	243 69	.....	556 45	.....	6,892 29	.....
.....	26	.....	116 04	.....	122 81	.....
.....	74 96	.....	101 27	.....	1,847 78	.....
.....	87 80	.....	1,020 81	.....	3,303 56	.....
.....	179 10	.....	1,949 08	.....	2,707 59	.....
.....	177 90	.....	295 08	.....	4,330 51	.....
.....	57 76	.....	252 11	.....	1,753 99	.....
1,075 63	43 02	.....	448 58	.....	491 60	.....
.....	692 03	.....	2,078 83	.....	15,913 87	.....
.....	50 79	.....	208 07	.....	1,528 63	.....
.....	26 88	.....	532 57	.....	505 69	.....
981 53	67 23	.....	513 02	.....	1,542 92	.....
717 11	8 93	.....	528 47	.....	296 19	.....
.....	31 36	.....	89 80	.....	58 44	.....
814 94	4 51	.....	37 54	.....	154 71	.....
.....	379 37	.....	779 25	.....	1,688 37	.....
12,331 15	.....	.....	.....	.....	.....	.....
.....	927 95	.....	591 56	.....	24,718 14	.....
.....	177 37	.....	10,929 02	.....	6,317 28	.....
.....	259 59	.....	1,206 82	.....	7,956 19	.....
.....	74 55	.....	1,540 66	.....	3,479 07	.....
.....	18 53	.....	143 71	.....	337 96	.....
.....	144 70	.....	207 02	.....	3,555 12	.....
.....	936 53	.....	1,051 50	.....	25,401 19	.....
.....	218 99	.....	2,970 72	.....	8,664 40	.....

NIAGARA

Statement Showing the Surplus or Shortage of each Municipality at 31st October, 1918, the Shortage for the Year Ending 31st October, 1919, and

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918	
		Surplus	Shortage *
		\$ c.	\$ c.
Tavistock	Nov., 1916	2,160 77	.....
Thamesford	Feb., 1914	.....	2,110 65
Thamesville	Oct., 1915	.....	1,894 15
Thorndale	Mar., 1914	.....	3,985 14
Tilbury	Apr., 1915	.....	4,639 43
Tillsonburg	Aug., 1911	.....	3,666 25
Toronto	June 1911	129,125 46	.....
Toronto Twp.	Aug., 1913	868 60	.....
Walkerville	Nov., 1914	.....	3,086 47
Wallaceburg	Feb., 1915	.....	5,118 63
Waterdown	Nov., 1911	.....	863 68
Waterford	Apr., 1915	1,581 51	.....
Waterloo	Dec., 1910	8,013 32	.....
Watford	Sep., 1917	.....	2,109 31
Welland	Sep., 1917	7,064 73	.....
Wellesley	Nov., 1916	532 47	.....
West Lorne	Jan., 1917	64 02	.....
Weston	Aug., 1911	8,686 29	.....
Windsor	Oct., 1914	.....	19,177 26
Woodbridge	Dec., 1914	.....	138 58
Woodstock	Jan., 1911	17,213 72	.....
Wyoming	Nov., 1916	.....	1,415 22
Zurich	Sep., 1917	118 03	.....
Breslau	Dec., 1913	.....	1,012 59
Petersburg and St. Agatha	Sep., 1913	105 11	.....
		554,208 75	177,088 11

SYSTEM

Shortages Paid, Adjustments Made and Interest Added during the Year, also the Surplus of the Net Surplus or Shortage at 31st October, 1919.

Shortages Paid and Adjust- ments Made during the year	Interest on Surplus or Shortage at 4% per annum Added during the Year		Surplus or Shortage for the Year Ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
	Credited	Charged	Surplus	Shortage	Surplus	Shortage
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
.....	86 43	.....	1,419 16	.....	3,666 36	.....
.....	.....	84 43	699 03	.....	.....	1,496 05
.....	.....	75 77	.....	55 21	.....	2,025 13
2,516 05	.....	58 76	239 03	.....	.....	1,288 82
.....	.....	185 58	.....	433 97	.....	5,258 98
3,666 25	.....	93 32	3,222 33	.....	3,129 01	.....
.....	5,165 02	.....	.....	106,854 51	27,435 97	.....
.....	34 74	.....	.....	197 00	706 34	.....
.....	.....	123 46	9,356 56	.....	6,146 63	.....
.....	.....	204 75	3,163 69	.....	.....	2,159 69
.....	.....	34 55	.....	390 94	.....	1,289 17
.....	63 26	.....	1,017 43	.....	2,662 20	.....
.....	320 53	.....	430 03	.....	8,763 88	.....
.....	.....	84 37	.....	1,673 67	.....	3,867 35
.....	282 59	.....	2,101 50	.....	9,448 82	.....
.....	21 30	.....	521 20	.....	1,074 97	.....
.....	2 56	.....	315 24	.....	381 82	.....
3,061 89 Dr.	347 45	.....	3,015 02	.....	8,986 87	.....
.....	.....	767 09	8,816 81	.....	.....	11,127 54
.....	.....	5 54	388 80	.....	244 68	.....
.....	688 55	.....	1,118 38	.....	19,020 65	.....
.....	.....	56 61	.....	635 84	.....	2,107 67
447 31	22 61	.....	705 08	.....	1,293 03	.....
.....	.....	.....	.....	1,375 09	.....	2,425 27
2 80	.....	40 39	.....	624 35	.....	510 91
3 97	4 36	.....	.....	.....	.....	.....
47,838 81	22,186 76	6,487 67	109,287 70	172,755 74	518,938 34	141,744 84

NIAGARA

Statement showing Cost of Power, Operating Expenses, Fixed Charges
the year ending

Lines Operated by	Capital Cost	Cost of Power to Commission	Operation, Maintenance and Adminis- tration Expenses	Interest
	\$ c.	\$ c.	\$ c.	\$ c.
Ancaster Township	5,159 03	.....	.....	602 58
Bolton	2,110 45	.....	.....	105 25
Bothwell	6,573 59	.....	.....	356 00
Brampton	588 87	.....	.....	.....
Chatham	898 18	.....	.....	44 90
Dereham Township	29,246 10	.....	.....	1,369 96
Elora	777 82	.....	.....	38 90
Etobicoke	54,607 25	.....	.....	2,888 72
Georgetown	8,889 59	.....	.....	444 48
Goderich	2,313 36	.....	.....	115 66
Milton	813 82	.....	.....	40 70
Norwich	33,459 65	.....	.....	1,684 92
Preston	9,155 08	.....	.....	457 76
St. Thomas	1,923 93	.....	.....	96 20
Scarboro Township	39,604 21	686 92	299 44	2,294 76
Springfield	3,262 09	.....	.....	139 18
Stratford	4,058 47	.....	.....	202 92
Toronto	41,167 92	.....	.....	2,045 52
Toronto Township	43,309 37	.....	.....	2,165 26
Vaughan Township	22,422 59	.....	.....	1,261 40
Walkerville	38,440 69	.....	.....	1,917 95
Waterdown	11,825 24	.....	.....	591 26
Waterford	3,636 23	.....	.....	191 82
Waterloo	5,062 60	.....	.....	230 60
Weston	5,234 46	.....	.....	209 38
Windsor	8,451 62	.....	.....	422 58
Woodstock	1,088 20	.....	.....	54 42
Welland	30,108 92	4,387 93	.....	1,447 70
St. Catharines	7,500 00	45,858 89	16 51	300 00
Grantham Township	28,224 07	438 00	21 03	1,398 17
Louth Township	2,771 19	.....	.....	138 56
Lines Operated by the Hydro-Electric Power Commission of Ontario:				
Don Mills Road	10,131 68	315 92	103 32	405 27
Brady & Raymond	817 18	.....	1 65	32 67
Wm. Pullen	74 15	.....	.....	2 96
Innes, Karn & Longworth	2,875 20	.....	120 10	114 84
W. O. Bailey	599 21	.....	1 56	23 97
Port Dalhousie	5,888 10	1,660 76	24 18	235 52
	473,070 11	53,348 42	587 79	24,072 74

Fixed Charges		Total Cost of Power, Operat- ing Expenses, Fixed Charges and Interest	Revenue from Muni- cipalities	Net Surplus or Shortage for Year	
Renewals	Sinking Fund			Surplus	Shortage
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
.....	92 86	695 44	695 44	.....	.....
.....	37 88	143 13	145 13	.....	.....
.....	547 60	903 60	903 60	.....	.....
.....	16 16	61 06	61 06	.....	.....
.....	488 07	1,858 03	1,858 03	.....	.....
.....	14 00	52 90	52 90	.....	.....
.....	955 45	3,844 17	3,844 17	.....	.....
.....	160 00	604 48	604 48	.....	.....
.....	41 64	157 30	157 30	.....	.....
.....	14 64	55 34	55 34	.....	.....
.....	606 58	2,291 50	2,291 50	.....	.....
.....	164 80	622 56	622 56	.....	.....
.....	34 64	130 84	130 84	.....	.....
20 21	701 86	4,003 19	3,901 05	.....	102.14
.....	47 86	187 04	187 04	.....	.....
.....	73 04	275 96	275 96	.....	.....
.....	737 93	2,783 45	2,783 45	.....	.....
.....	779 49	2,944 75	2,944 75	.....	.....
.....	403 60	1,665 00	1,665 00	.....	.....
.....	690 46	2,608 41	2,608 41	.....	.....
.....	212 86	804 12	804 12	.....	.....
.....	69 06	260 88	260 88	.....	.....
.....	91 14	321 74	321 74	.....	.....
.....	94 22	303 60	303 60	.....	.....
.....	152 12	574 70	574 70	.....	.....
.....	19 58	74 00	74 00	.....	.....
.....	521 18	6,356 81	6,364 84	8 03	.....
.....	135 00	46,310 40	46,377 44	67 04	.....
.....	503 35	2,360 55	2,370 79	10 24	.....
.....	49 88	188 44	188 44	.....	.....
405 27	182 37	1,412 15	789 69	.....	622 46
32 67	14 70	81 69	113 65	31 96	.....
2 96	1 33	7 25	96 00	88 75	.....
114 84	51 75	401 53	403 45	1 92	.....
23 97	10 79	60 29	96 57	36 28	.....
235 52	105 99	2,261 97	2,415 18	153 21	.....
835 44	8,823 88	87,668 27	87,341 10	397 43	724 60

NIAGARA RURAL LINES

Reserve for Renewals Account—31st October, 1919

Total provision for Renewals to 31st October, 1918	\$3,978 42	
Deduct expenditures to 31st October, 1918	655 41	
		\$3,323 01
Amount added during the year ending 31st October, 1919:		
Amounts charged Municipalities and lines operated by the Commission as part of the cost of power delivered to them	\$835 44	
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	132 92	
		968 36
		\$4,291 37
Expenditures during the year ending 31st October, 1919		17 69
		\$4,273 68

NIAGARA RURAL LINES

Statement showing the Total Sinking Fund Requirements of each line and the Total Sinking Fund Payments including interest allowed thereon to 31st October, 1919.

NIAGARA

Statement showing the Total Sinking Fund Requirements of each line thereon to

Municipality	Sinking Fund Requirements	
	Period Covered	Amount
Ancaster Twp.	1914 to 1919 Inclusive	\$ c. 542 59
Baden	1913 to 1919 "	157 34
Bolton	1915 to 1919 "	123 95
Bothwell	1916 to 1919 "	1,207 61
Brampton	1918 to 1919 "	22 96
Chatham	1916 to 1919 "	61 58
Dereham Twp.	1918 to 1919 "	928 17
Elora	1914 to 1919 "	69 91
Etobicoke	1916 to 1919 "	1,874 76
Georgetown	1914 to 1919 "	784 99
Goderich	1914 to 1919 "	224 98
Grantham Twp.	1915 to 1919 "	2,180 68
London Abattoir	1914 to 1919 "	60 94
Louth Twp.	1919 "	49 88
Milton	1914 to 1919 "	73 92
Mimico	1913 to 1919 "	921 33
New Toronto	1914 to 1919 "	168 28
Norwich	1913 to 1919 "	2,573 59
Port Dalhousie	1912 to 1919 "	588 34
Preston	1913 to 1919 "	1,076 42
St. Catharines	1914 to 1919 "	753 75
St. Thomas	1914 to 1919 "	173 13
Scarboro Twp.	1918 to 1919 "	873 74
South Dorchester Twp.	1917 to 1919 "	100 06
Stratford	1913 to 1919 "	431 69
Thamesford	1915 to 1919 "	6 32
Thorndale	1914 to 1919 "	5 57
Toronto	1913 to 1919 "	3,698 46
Toronto Twp.	1913 to 1919 "	3,708 69
Vaughan Twp.	1915 to 1919 "	675 19
Walkerville	1915 to 1919 "	2,643 14
Waterdown	1914 to 1919 "	1,086 08
Waterford	1915 to 1919 "	154 28
Waterloo	1914 to 1919 "	331 04
Welland	1913 to 1919 "	2,996 60
Weston	1914 to 1919 "	706 20
Windsor	1916 to 1919 "	494 40
Woodstock	1913 to 1919 "	105 04
<i>Lines Operated by the Commission.</i>		
Don Mills Road	1914 to 1919 "	835 47
Brady & Raymond	1914 to 1919 "	93 63
W. Pullen	1914 to 1919 "	7 04
Innes, Karn & Longworth	1913 to 1919 "	341 54
Bailey's Farm	1914 to 1919 "	53 92
		33,967 20

RURAL LINES

and the Total Sinking Fund Payments including interest allowed
31st October, 1919

Sinking Fund Charged or Paid		Interest at 4% per annum allowed on Sinking Fund Payments	Total Sinking Fund payments and accumulated interest to 31st October, 1919
Period Covered	Amount		
	\$ c.	\$ c.	\$ c.
1914 to 1919	542 59	67 62	610 21
1913 to 1919	157 34	29 87	187 31
1915 to 1919	123 95	7 46	131 41
1916 to 1919	1,207 61	33 89	1,241 50
1918 to 1919	22 96	92	23 88
1916 to 1919	61 58	3 59	65 17
1918 to 1919	928 17	17 60	945 77
1914 to 1919	69 91	5 81	75 72
1916 to 1919	1,874 76	36 77	1,911 53
1914 to 1919	784 99	68 27	853 26
1914 to 1919	224 98	20 20	245 18
1915 to 1919	2,180 68	154 07	2,334 75
1914 to 1919	60 94	7 61	68 55
1919	49 88	.....	49 88
1914 to 1919	73 92	6 12	80 04
1913 to 1919	921 33	127 92	1,049 25
1914 to 1919	168 28	21 16	189 44
1913 to 1919	2,573 59	184 51	2,758 10
1912 to 1919	588 34	45 39	633 73
1913 to 1919	1,076 42	123 32	1,199 74
1914 to 1919	753 75	73 26	827 01
1914 to 1919	173 13	14 40	187 53
1918 to 1919	873 74	6 88	880 62
1917 to 1919	100 06	2 09	102 15
1913 to 1919	431 69	44 82	476 51
1915 to 1919	6 32	92	7 24
1914 to 1919	5 57	65	6 22
1913 to 1919	3,698 49	314 81	4,013 30
1913 to 1919	3,708 66	319 37	4,028 03
1915 to 1919	675 19	10 86	686 05
1915 to 1919	2,643 14	166 93	2,810 07
1914 to 1919	1,086 08	95 57	1,181 65
1915 to 1919	154 28	4 51	158 79
1914 to 1919	331 04	21 64	352 68
1913 to 1919	2,996 60	250 50	3,247 10
1914 to 1919	706 20	67 40	773 60
1916 to 1919	494 40	21 61	516 01
1913 to 1919	105 04	9 81	114 85
1914 to 1919	835 47	59 20	894 67
1914 to 1919	93 63	7 97	101 60
1914 to 1919	7 04	54	7 58
1913 to 1919	341 54	29 56	371 10
1914 to 1919	53 92	4 01	57 93
.....	33,967 20	2,489 41	36,456 61

NIAGARA

Statement Showing the Surplus or Shortage of each Customer at 31st October,
Year ending 31st October, 1919, and the Net

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918	
		Surplus	Shortage
		\$ c.	\$ c.
Grantham Twp.....	May, 1915	.....	18 40
St. Catharines.....	Apr., 1914	.....	89 29
Scarboro Township.....	Aug., 1918	89 39	.....
Welland.....	Mar., 1913	18 32	.....
Lines Operated by Commission:			
Don Mills Road.....	Nov., 1914	.....	2,742 42
Brady & Raymond.....	Oct., 1914	197 47	.....
Wm. Pullen.....	May, 1914	440 43	.....
Innes, Karn & Longworth.....	Feb., 1913	356 92	.....
W. G. Bailey.....	Oct., 1914	51 49	.....
Port Dalhousie.....	Nov., 1912	.....	32 49
		1,154 02	2,882 60

RURAL LINES

1918, Interest added during the year; also the Surplus or Shortage for the Surplus or Shortage at 31st October, 1919

Interest on Surplus or Shortage at 4% per annum added during the year		Surplus or Shortage for the year ending 31st October, 1919		Net Surplus or Shortage on October 31, 1919	
Credited	Charged	Surplus	Shortage	Surplus	Shortage
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
.....	74	10 24	.....	.....	8 90
.....	3 57	67 04	.....	.....	25 82
3 58	.....	.....	102 14	.....	9 17
73	.....	8 03	.....	27 08	.....
.....	109 70	.....	622 46	.....	3,474 58
7 90	.....	31 96	.....	237 33	.....
17 62	.....	88 75	.....	546 80	.....
14 28	.....	1 92	.....	373 12	.....
2 06	.....	36 28	.....	89 83	.....
.....	1 30	153 21	.....	119 42	.....
46 17	115 31	397 43	724 60	1,393 58	3,518 47

SEVERN

Statement showing the Amount to be paid by each Municipality as the Cost under Section
—the Amount received by the Commission from each Municipality on account of
Good by each Municipality with overpayment or underpayment

Municipality	Interim Rates per Horse Power Col- lected by Commission during Year		Share of Capital Cost of System on which Interest and fixed Charges are Payable for Year	Average Horse Power Supplied in Year after Correction for Power Factor	Cost of Power Purchased from Eugenia and Wasdell Systems	Share of Operating Charges	
	10 Apr. 30/19	To Oct. 31/19				Operating Maintenance and Administrative Expenses	Interest
	\$ c.	\$ c.	\$ c.		\$ c.	\$ c.	\$ c.
Alliston.....	.....	40 00	63,982 72	96.5	703 05	1,809 89	2,717 20
Barrie.....	31 00	29 00	112,880 07	554.2	4,037 63	4,484 81	4,573 47
Beeton.....	.....	45 00	67,875 25	91.4	665 90	1,808 54	2,888 79
Bradford.....	.....	47 00	49,130 07	28.9	210 55	1,208 65	2,112 39
Coldwater.....	28 00	40 00	14,769 06	40.5	353 35	932 07	612 15
Collingwood.....	30 00	28 00	330,272 71	1,443.8	10,518 83	15,496 18	13,424 37
Cooktown.....	35 00	35 00	24,613 15	52.7	383 95	926 70	1,036 33
Creemore.....	54 13	60 00	22,733 24	45.8	333 68	982 77	958 84
Elmvale.....	31 00	31 00	24,871 49	119.7	872 08	1,510 52	1,009 08
Midland.....	19 00	20 00	239,152 57	1,376.2	10,026 32	8,949 99	9,573 60
Penetang.....	22 00	22 00	119,738 35	633.6	4,616 10	5,417 92	4,825 09
Port McNichol.....	25 00	35 00	7,427 53	24.7	179 95	812 35	307 70
Stayner.....	35 00	35 00	28,691 18	115.4	840 75	1,652 95	1,177 06
Thornton.....	43 00	43 00	9,533 71	7.6	55 37	494 30	408 80
Tottenham.....	.....	51 00	34,335 67	30.5	222 20	878 28	1,470 37
Victoria Harbour.....	35 00	35 00	11,258 91	35.2	256 45	741 63	467 67
Waubashene.....	25 00	30 00	5,702 68	20.5	149 36	404 21	235 36
Totals—Municipalities..	.....	.....	1,166,968 36	.....	34,425 52	48,511 76	47,798 27
Totals—Companies.....	.....	.....	181,762 66	.....	8,044 67	8,264 46	7,242 89
Grand Total.....	.....	.....	1,348,731 02	.....	42,470 19	56,776 22	55,041 16

SYSTEM

23 of the Act, of Power supplied to it by the Commission in the year ending October 31, 1919 such Cost and the surplus carried to the credit of or the shortage to be made for the Power supplied to it in the year ending 31st October, 1919.

Costs and Fixed		Sinking Fund	Total Cost of Power for year as Provided to be Paid under Section 23 of Act	Amount Paid by Municipalities to Commission in respect of Power Supplied in Year	Profit from Sale of Power to Companies	Total Revenue	Surplus or Shortage between Cost of Power and Payment Made to Commission in Respect thereof in Year		Year Sinking Fund Paid
Renewals	Contingencies						Surplus	Shortage	
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	
1,724 39	24 12	.....	6,978 65	3,840 01	28 40	3,868 41	.....	3,110 24	.....
2,902 42	138 55	1,307 78	17,444 66	16,625 61	63 16	16,688 77	.....	755 89	1917
1,833 28	22 85	.....	7,219 36	4,112 60	29 53	4,142 13	.....	3,077 23	.....
1,340 56	7 22	.....	4,879 37	1,359 87	20 73	1,380 60	.....	3,498 77	.....
388 48	12 13	212 41	2,510 59	1,508 29	14 62	1,522 91	.....	987 68	1917
8,519 37	360 95	3,876 03	52,195 73	42,149 97	170 22	42,320 19	.....	9,875 54	1917
657 68	13 17	.....	3,017 83	1,844 77	12 77	1,857 54	.....	1,160 29	.....
608 50	11 45	.....	2,895 24	2,517 43	16 73	2,534 16	.....	361 08	.....
640 38	29 93	224 70	4,286 69	3,709 92	19 52	3,729 44	.....	557 25	1917
6,075 60	344 05	1,858 63	36,828 19	26,832 98	114 89	26,947 87	.....	9,880 32	1917
3,062 10	158 40	2,004 25	20,083 86	13,938 27	79 62	14,017 89	.....	6,065 97	1919
195 27	6 18	.....	1,501 45	742 12	9 72	751 84	.....	749 61	.....
746 99	28 85	224 52	4,671 12	4,038 90	22 11	4,061 01	.....	610 11	1917
259 43	1 90	.....	1,219 80	325 71	8 39	334 10	.....	885 70	.....
933 13	7 63	.....	3,511 61	1,554 20	12 40	1,566 60	.....	1,945 01	.....
296 79	8 80	.....	1,771 34	1,232 26	9 10	1,241 36	.....	529 98	.....
149 36	5 12	.....	943 41	564 21	2 98	567 19	.....	376 22	.....
30,333 73	1,181 30	9,708 32	171,958 90	126,897 12	634 89	127,532 01	.....	44,426 89	.....
4,596 49	276 05	3,008 56	31,433 12	32,068 01	.....	.....	723 24	88 35	.....
34,930 22	1,457 35	12,716 88	203,392 02	158,965 13	634 89	.....	723 24	44,515 24	.....

SEVERN SYSTEM

Statement Showing the Total Sinking Fund Requirements of each Municipality Sinking Fund Requirements the payment of which have been deferred by the Commission under Section 23 of the Act Sinking Fund Payments made by certain Municipalities who have been operating more than five years and the Total of the Sinking Fund Payments including interest allowed thereon to October 31, 1919

Municipality	Sinking Fund Requirements		Sinking Fund Requirements Payments Deferred		Sinking Fund Charged or Paid		Interest at 4% per annum allowed on Sinking Fund Payments	Total Sinking Fund Payments and accumulated Interest to October 31, 1919
	Period Covered	Amount	Period Covered	Amount	Period Covered	Amount		
Alliston	1918 & 1919 Inclusive	\$ 1,635 74	1918 & 1919	\$ 1,635 74	1917	1,307 78	\$ c.	\$ c.
Barrie	1917 to 1919	4,585 17	"	3,277 39	1917	1,307 78	.....	1,307 78
Beeton	1917 & 1919	1,572 99	"	1,572 99	.....	.....	.....	.....
Bradford	"	952 55	"	952 55	.....	.....	.....	.....
Coldwater	1919 to 1919	671 04	"	458 63	1917	212 41	.....	212 41
Collingwood	"	14,430 54	"	10,554 51	1917	3,876 03	.....	3,876 03
Cookstown	1918 & 1919	667 92	"	667 92	.....	.....	.....	.....
Greenore	1917 to 1919	1,152 03	1917 to 1919	1,152 03	.....	.....	.....	.....
Elmvale	"	998 40	1918 & 1919	773 70	1917	224 70	.....	224 70
Midland	"	8,678 15	"	6,819 52	1917	1,858 63	.....	1,858 63
Penetang	"	4,533 33	.....	.....	1917 to 1919	4,533 33	.....	4,681 11
Port McNichol	"	333 88	1917 to 1919	333 88	.....	.....	.....	.....
Stayner	"	1,034 26	1918 & 1919	809 74	.....	.....	.....	.....
Thornton	"	169 81	1919	169 81	1917	224 52	.....	224 52
Tottenham	1918 & 1919	674 59	1918 & 1919	674 59	.....	.....	.....	.....
Victoria Harbour	1917 to 1919	504 43	1917 to 1919	504 43	.....	.....	.....	.....
Waubashene	"	262 29	"	262 29	.....	.....	.....	.....
Companies in Severn System	1916 to 1919	42,857 12	.....	30,619 72	.....	12,237 40	147 78	12,385 18
		9,166 85	.....	.....	1916 to 1919	9,166 85	469 42	9,636 27
		52,023 97	.....	30,619 72	.....	21,404 25	617 20	22,021 45

SEVERN SYSTEM

Statement showing the Surplus or Shortage of each Municipality at 31st October, 1918, the Shortages Paid, Adjustments made and Interest added during the year, also the Surplus or Shortage for the year ending 31st October, 1919, and the Net Surplus or Shortage at 31st October, 1919

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918		Shortages paid and Adjustments made during the year		Interest on Surplus or Shortage at 4 % per annum added during the year		Surplus or Shortage for the year ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
		\$	c.	\$	c.	\$	c.	\$	c.	\$	c.
Alliston	June, 1918	11,680	23	1,123	11	44	92	3,110	24	11,391	55
Barrie	Apr., 1913			855	70	34	23	755	89		
Beeton	Aug., 1918			228	20	9	13	3,077	23		
Bradford	Oct., 1918			1,826	50	73	06	3,498	77		
Coldwater	Mar., 1913							987	68		
Collingwood	Mar., 1913	24,907	94					9,875	54	16,028	72
Cookstown	May, 1918			487	33	19	49	1,160	29		
Creemore	Nov., 1914	2,653	54			106	14	361	08	2,398	60
Elmvale	June, 1913	662	79			26	51	557	25	132	05
Midland	July, 1911			4,056	96			9,880	32		
Penetang	July, 1911	6,323	87			252	95	6,065	97	510	85
Port McNicol	Jan., 1915			1,430	20	57	21	749	61		
Stayner	Oct., 1913	595	48			23	82	610	11	9	19
Thornton								885	70		
Tottenham	Oct., 1918			159	04	6	36	1,945	01		
Victoria Harbor	July 1914	697	34			27	89	529	98	195	25
Waubashene	Dec., 1914	230	44			9	22	376	22		
		47,751	63	10,167	04	406	68	44,426	89	30,666	21
						1,910	06			36,005	13

SEVERN SYSTEM

Reserve for Contingency Account—31st October, 1919

Balance brought forward 31st October, 1918		\$8,139 57
Added during the year ending 31st October, 1919:		
Amount charged to Municipalities as part of the cost of power delivered to them	\$1,181 30	
Provision against equipment employed in respect of contracts with sundry companies	276 05	
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	325 58	
		<u>1,782 93</u>
		\$9,922 50
Expenditures during the year ending 31st October, 1919		<u>4,811 82</u>
		<u>\$5,110 68</u>

SEVERN SYSTEM

Reserve for Renewals Account—31st October, 1919

Total provisions for renewals to 31st October, 1918	\$107,083 69
Deduct expenditures to 31st October, 1918	3,577 15
Balance brought forward, 31st October, 1918	<u>\$103,506 54</u>
Added during the year ending 31st October, 1919:	
Amounts charged to Municipalities as part of the Cost of power delivered to them	\$30,333 73
Provision against equipment employed in respect of con- tracts with sundry companies	4,596 49
Interest at 4% per annum on the monthly balances to the credit of the account	4,140 27
	<u>39,070 49</u>
	\$142,577 03
Expenditures during the year ending 31st October, 1919	825 22
	<u>\$141,751 81</u>

WASDELL'S

Statement Showing the Amount to be paid by each Municipality as the Cost under Section 23
The Amount received by the Commission from each Municipality on Account of such
Municipality with Overpayment or Underpayment for the

Municipality	Interim Rates per Horse Power Collected by Commission during year		Share of Capital Cost of System on which Interest and Fixed Charges are payable for year	Average H.P. supplied in year after correction for power factor	Share of Operating	
	To April 30, 1919	To Oct., 31, 1919			Operating, Maintenance and Administrative Expenses	Interest
	\$ c.	\$ c.	\$ c.		\$ c.	\$ c.
Beaverton	41 21	45 00	31,531 73	85.2	1,454 26	1,366 38
Brechin	50 00	55 00	29,431 36	46.6	979 77	1,275 36
Cannington	45 79	50 50	30,810 17	68.1	1,178 65	1,335 11
Sunderland	50 00	55 00	30,060 81	45.7	817 00	1,302 63
Woodville	50 00	55 00	26,017 60	42.1	720 44	1,127 43
Total Municipalities			147,851 67	287.7	5,150 12	6,406 91
Severn System			117,914 38	613.4	5,529 98	5,109 62
Grand Total			265,766 05	901.1	10,680 10	11,516 53

SYSTEM

of the Act, of Power Supplied to it by the Commission in the Year ending October 31, 1919.
Cost, and the Surplus carried to the Credit of or the Shortage to be made good by each
Power Supplied to it in the Year ending 31st October, 1919

Costs & Fixed Charges		Total Cost of Power for year as provided to be paid under Section 23 of Act	Amount paid by Municipality to Commission in respect of power supplied in year	Profit from Sale of Power to Severn System	Total Revenue	Surplus or Shortage between Cost of Power and Pay- ments made to Commission in re- spect thereof in year	
Renewals	Contin- gencies					Surplus	Shortage
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
1,103 61	21 30	3,945 55	3,600 79	161 08	3,761 87	.....	183 68
1,030 10	11 65	3,296 88	2,449 66	153 39	2,603 05	.....	693 83
1,078 35	17 03	3,609 14	3,196 31	108 75	3,305 06	.....	304 08
1,052 12	11 42	3,183 17	2,328 87	85 70	2,414 57	.....	768 60
910 62	10 53	2,769 02	2,149 12	80 08	2,229 20	.....	539 82
5,174 80	71 93	16,803 76	13,724 75	589 00	14,313 75	.....	2,490 01
4,126 99	153 35	14,919 94	15,508 94	.....	.....	*589 00	.....
9,301 79	225 28	31,723 70	29,233 69	.....	.....	.....	.....

* Credited to System on Maintenance Basis

WASDELL'S SYSTEM

Reserve for Contingencies Account—31st October 1919

Balance brought forward, 31st October, 1918		\$13,511 68
Added during the year ending 31st October, 1919:		
Amounts charged to Municipalities as part of the cost of power delivered to them	\$71 93	
Provision against equipment in respect of Severn System	153 35	
Interest at 4% per annum on monthly balances to the credit of the account	540 47	
		765 75
Balance carried forward, 31st October, 1919		<u>\$14,277 43</u>

WASDELL'S SYSTEM

Reserve for Renewals Account—31st October, 1919

Total provision for renewals, 31st October, 1918	\$37,230 93	
Deduct expenditures to 31st October, 1918	508 37	
		<hr/>
Balance brought forward, 31st October, 1918		\$36,722 56
Added during the year ending 31st October, 1919:		
Amounts charged to Municipalities as part of the cost of power delivered to them	\$5,174 80	
Provision against equipment employed in respect of Severn System	4,126 99	
Interest at 4% per annum on the monthly balances to the credit of the account	1,468 90	
		<hr/>
		10,770 69
		<hr/>
		\$47,493 25
Expenditures during the year ending 31st October, 1919		350 10
		<hr/>
Balance carried forward, 31st October, 1919		\$47,143 15
		<hr/>

WADDELL'S SYSTEM

Statement showing the Surplus or Shortage of each Municipality at 31st October, 1918, the Shortages Paid, Adjustments made and Interest added during the year, also the Surplus or Shortage for the year ending 31st October, 1919, and the Net Surplus or Shortage at 31st October, 1919

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918		Shortages paid and Adjustments made during the year	Interest on Surplus or Shortage at 4% per annum added during the year		Surplus or Shortage for the year ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
		Surplus	Shortage		Charged	Credited	Surplus	Shortage	Surplus	Shortage
Beaverton	Nov., 1914.....	\$ c.	\$ c. 8,490 21	\$ c.	\$ c. 339 61	\$ c.	\$ c.	\$ c. 183 68	\$ c.	\$ c. 9,013 50
Brechin.....	Jan., 1915.....	.....	5,699 46	.....	227 98	.....	.....	693 83	.....	6,621 27
Cannington.....	Nov., 1914.....	.....	7,954 58	.....	318 18	.....	.....	304 08	.....	8,576 84
Sunderland	Nov., 1914.....	.....	6,564 94	.....	262 60	.....	.....	768 60	.....	7,596 14
Woodville	Nov., 1914.....	.....	6,623 58	.....	264 94	.....	.....	539 82	.....	7,428 34
		.....	35,332 77	.....	1,413 31	.....	.....	2,490 01	.....	39,236 09

WASDELL'S RURAL LINES

Statement showing Capital, Interest and Sinking Fund, 31st October, 1919

	Capital Cost	Interest	Renewals	Sinking Fund	Total Interest and Fixed Charges	Revenue from Municipali- ties	Net Surplus or Shortage for Year	
							Surplus	Shortage
	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Beaverton	4,207 13	260 84	.....	75 72	336 56	336 56	.....	.....
Brechin.....	582 77	72 28	.....	43 62	93 25	93 25	.....	.....
Brock Twp.....	2,908 26	145 42	.....	20 97	189 04	189 04	.....	.....
	7,698 16	478 54	.....	140 31	618 85	618 85	.....	.....

WASDELL'S RURAL LINES

Statement showing the total Sinking Fund requirements of each Municipality, and the total of the Sinking Fund payments, including Interest allowed thereon to 31st October, 1919

	Sinking Fund Requirements		Sinking Fund Charged or Paid	Interest at 4 % per annum allowed on Sinking Fund Payments	Total Sinking Fund Payments and Accumulated Interest to 31st October, 1919
	Period Covered	Amount			
		\$ c.	\$ c.	\$ c.	\$ c.
Beaverton.....	1918 & 1919	104 75	104 75	1 16	105 91
Brechin.....	1919	20 97	20 97	.....	20 97
Brock Twp.....	1919	43 62	43 62	.....	43 62
		169 34	169 34	1 16	170 50

EUGENIA SYSTEM

Reserve for Renewals Account—31st October, 1919

Total provision for renewals to 31st October, 1918	\$70,090 30	
Deduct expenditures to 31st October, 1918	756 15	
Balance brought forward, 31st October, 1918		\$69,334 15
Added during the year ending 31st October, 1919:		
Amounts charged to Municipalities as part of the cost of power delivered to them	\$19,246 20	
Provision against equipment employed in respect of con- tracts with sundry companies	9,500 04	
Interest at 4% per annum on the monthly balances to the credit of the account	2,773 36	
		31,519 60
Expenditures during the year ending 31st October, 1919		\$100,853 75
		29 43
Balance carried forward, 31st October, 1919		<u>\$100,824 32</u>

EUGENIA SYSTEM

Statement showing the Amount to be paid by each Municipality as the cost under Section 23 of the Act, of power supplied to it by the Commission in the year ending October 31, 1919, the Amount received by the Commission from each Municipality on account of such cost, and the Surplus carried to the credit of or the Shortage to be made good by each Municipality with overpayment or underpayment for the power supplied to it in the year ending 31st October, 1919.

EUGENIA

Statement showing the Amount to be paid by each Municipality as the cost under October 31, 1919, the Amount received by the Commission from each Municipality to be made good by each Municipality with overpayment or underpay-

Municipality	Interim Rates per Horse Power Collected by Commission during year		Share of Capital Cost of System on which Interest and Fixed Charges are payable for year	Average Horse Power supplied in year after correction for power factor	Share of Costs and	
	To Apr. 30, 1919	To Oct. 31, 1919			Operating Maintenance Administrative Expenses	Interest
	\$ c.	\$ c.	\$ c.		\$ c.	\$ c.
Arthur	45 00	45 00	88,906 78	151.9	3,538 62	3,796 71
Chatsworth	30 18	33 00	10,212 05	29.4	475 54	439 20
Chesley	40 00	40 00	68,533 58	159.8	2,070 32	2,951 77
Dundalk	27 30	27 00	23,802 31	93.9	1,350 01	1,020 83
Durham	33 97	30 00	18,750 88	74.3	1,269 59	804 15
Elmwood	35 00	35 00	17,509 07	45.8	864 06	753 53
Flesherton	25 96	26 00	15,608 33	58.1	698 01	669 11
Grand Valley ...	45 00	45 00	27,773 74	57.5	1,244 16	1,182 34
Hanover	35 00	35 00	122,574 32	416.4	5,068 72	5,064 34
Hornings Mills			4,449 80	5.3	661 58	191 95
Holstein	43 50	44 00	15,372 67	23.	709 70	663 56
Markdale	23 24	23 00	17,688 90	74.	755 07	757 73
Mount Forest ...	34 51	40 00	65,931 77	129.3	2,577 64	2,842 44
Neustadt	42 50	42 50	18,650 78	18.5	424 72	797 21
Orangeville	35 00	35 00	70,545 81	134.3	2,456 53	2,967 61
Owen Sound	31 00	28 00	259,636 21	934.9	8,448 87	11,145 43
Shelburne	30 00	30 00	46,284 47	144.8	1,942 91	1,981 87
Tara	37 00	37 00	39,725 40	36.2	812 39	1,717 32
Totals—Municipalities			931,956 87		35,368 44	39,747 10
Totals—Companies and Severn System			457,342 47		14,834 81	19,619 22
Grand Total			1,389,299 34		50,203 25	59,366 32

SYSTEM

Section 23 of the Act, of power supplied to it by the Commission in the year ending on account of such Cost, and the Surplus carried to the credit of or the Shortage ment for the power supplied to it in the year ending 31st October, 1919

Operating Fixed Charges		Total Cost of Power for year as provided to be paid under Section 23 of Act	Amount paid by Municipality to Commission in respect of power supplied in year	Profit from Sale of Power to Severn System	Total Revenue	Surplus or Shortage between Cost of Power and Payments made to Commission in respect thereof in year	
Renewals	Contingencies H.P. Basis					Surplus	Shortage
\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
1,838 45	37 98	9,211 76	6,802 10	192 43	6,994 53	.....	2,217 23
212 67	7 35	1,134 76	884 67	20 44	905 11	.....	229 65
1,429 31	39 95	6,491 35	6,127 67	103 67	6,231 34	.....	260 01
494 31	23 48	2,888 63	2,464 84	63 83	2,528 67	.....	359 96
389 39	18 58	2,481 71	2,488 04	51 68	2,539 72	58 01	.....
364 88	11 45	1,993 92	1,551 66	31 71	1,583 37	.....	410 55
324 00	14 53	1,705 65	1,508 95	25 24	1,534 19	.....	171 46
572 51	14 37	3,013 38	2,499 73	67 26	2,566 99	.....	446 39
2,452 26	104 10	13,689 42	14,485 99	238 38	14,724 37	2,034 95	.....
92 95	1 32	947 80	594 11	22 55	616 66	.....	331 14
321 31	5 75	1,700 32	1,005 53	38 47	1,044 00	.....	656 32
366 90	18 50	1,898 20	1,648 96	27 06	1,676 02	.....	222 18
1,376 37	32 32	6,828 77	4,445 51	159 29	4,604 80	.....	2,223 97
386 03	4 62	1,612 58	761 09	18 96	780 05	.....	832 53
1,436 79	33 58	6,894 51	4,510 63	145 49	4,656 12	.....	2,238 39
5,396 85	233 73	25,224 88	27,601 45	348 02	27,949 47	2,724 59	.....
959 66	36 20	4,920 64	4,196 00	95 58	4,291 58	.....	629 06
831 56	9 05	3,370 32	1,280 80	41 42	1,322 22	.....	2,048 10
*19,246 20	646 86	95,008 60	84,857 73	1,691 48	86,549 21	4,817 55	13,276 94
9,500 04	440 70	44,394 77	47,839 33	.....	.....	**3,444 56	.....
28,746 24	1,087 56	139,403 37	132,697 06	.....	.....	.....	.....

*Renewals based upon depreciable values only—Flooded lands and certain concrete dams eliminated.

**Credited to System on Maintenance Basis.

EUGENIA SYSTEM

Reserve for Contingencies Account—31st October, 1919

Balance brought forward, 31st October, 1918		\$16,717 61
Added during the year ending 31st October, 1919:		
Amount charged to Municipalities as part of the cost of power delivered to them	\$646 86	
Provision against equipment employed in respect of contracts with sundry companies	440 70	
Net profit from contracts with companies applied to Reserve for Contingencies	1,753 08	
Interest at 4% per annum on monthly balances to the credit of the account	668 70	
		<u>3,509 34</u>
Expenditures during the year ending 31st October, 1919	\$364 73	\$20,226 95
Adjustments during year <i>re</i> contracts with companies	373 74	
		<u>738 47</u>
Balance carried forward, 31st October, 1919		<u>\$19,488 48</u>

EUGENIA SYSTEM

Statement showing the Surplus or Shortage of each Municipality at 31st October, 1918, the Shortages Paid, Adjustments Made and Interest Added during the Year, also the Surplus or Shortage for the Year ending 31st October, 1919, and the Net Surplus or Shortage at 31st October, 1919

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918		Shortages paid and Adjustments made during the year	Interest on Surplus or Shortage at 4 % per annum added during the year		Surplus or Shortage for the year ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
		Surplus	Shortage		Credited	Charged	Surplus	Shortage	Surplus	Shortage
Arthur	Dec., 1916.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
Chatsworth	Dec., 1915.	.....	3,171 77	541 59 Dr	.....	126 87	.....	2,217 23	.....	6,057 46
Chesley	July, 1916.	.....	840 47	.....	.....	33 62	.....	229 65	.....	1,103 74
Dundalk	Dec., 1915.	.....	5,493 81	.....	.....	219 75	.....	260 01	.....	5,973 57
Durham	Dec., 1915.	.....	2,171 10	.....	.....	86 84	.....	359 96	.....	2,617 90
Elmwood	Apr., 1918.	.....	2,207 95	.....	.....	88 32	58 01	.....	.....	2,238 26
Flesherton	Dec., 1915.	.....	239 26 Cr	.....	.....	6 50	.....	410 55	.....	417 05
Grand Valley	Dec., 1916.	.....	1,195 29	.....	.....	47 81	.....	171 46	.....	1,414 56
Hanover	Sep., 1916.	744 98	476 63	205 02 Dr	29 80	19 07	.....	446 39	2,809 73	1,147 11
Holstein	May, 1916.	.....	1,925 54	.....	.....	77 02	2,034 95	656 32	.....	2,658 88
Hornings Mills	July, 1916.	359 04	.....	.....	14 36	.....	.....	331 14	42 26	.....
Markdale	Mar., 1916.	.....	1,175 25	.....	.....	47 01	.....	222 18	.....	1,444 44
Mount Forest	Dec., 1915.	.....	10,635 46	.....	.....	425 42	.....	2,223 97	.....	13,284 85
Neustadt .....	.....	.....	.....	.....	.....	.....	.....	832 53	.....	832 53
Orangeville	July, 1916.	.....	1,925 87	1,142 79 Dr	.....	77 03	.....	2,238 39	.....	5,384 08
Owen Sound	Dec., 1915.	9,091 43	.....	363 66	.....	.....	2,724 59	.....	12,179 68	.....
Shelburne	July, 1916.	.....	1,852 35	1,157 88 Cr	.....	74 10	.....	629 06	.....	1,397 63
Tara	Feb., 1918.	.....	1,668 38	.....	.....	66 74	.....	2,048 10	.....	3,783 22
		10,195.45	34,979 13	492 26 Dr	407 82	1,396 10	4,817 55	13,276 94	15,031 67	49,755 28

EUGENIA RURAL LINES

Statement showing Capital, Interest and Sinking Fund, 31st October, 1919

—	Capital Cost	Interest	Renewals	Sinking Fund	Total Interest and Fixed Charges	Revenue from Municipal- ities	Net Surplus or Shortage for year	
							Surplus	Shortage
Markdale.....	\$ 1,182 53	\$ 62 38	.....	\$ 21 30	\$ 83 68	\$ 83 68	.....	.....
Flesherton.....	512 08	31 74	.....	9 22	40 96	40 96	.....	.....
Total.....	1,694 61	94 12	.....	30 52	124 64	124 64	.....	.....

EUGENIA RURAL LINES

Statement showing the total Sinking Fund requirements of each Municipality and the total of the Sinking Fund Payments including interest allowed thereon to 31st October, 1919

—	Sinking Fund Require- ments		Sinking Fund Charged or Paid	Interest at 4 % per annum allowed on Sinking Fund Payments	Total Sinking Fund Payments and accumulated Interest to 31st October, 1919
	Period Covered	Amount			
Markdale.....	1917 to 1919	\$ 54 23	\$ 54 23	\$ 1 76	\$ 55 99
Flesherton.....	1918 & 1919	16 14	16 14	28	16 42
Total.....	.....	70 37	70 37	2 04	72 41

MUSKOKA SYSTEM

Statement showing the Amount to be Paid by each Municipality as the Cost under Section 23 of the Act, of Power supplied to it by the Commission in the year ending October 31st, 1919, the Amount received by the Commission from each Municipality on account of such Cost, and the Surplus carried to the credit of or the shortage to be made good by each Municipality with overpayment or underpayment for the Power supplied to it in the year ending 31st October, 1919

Municipality	Interim Rates per Horse Power collected by Commission during year		Share of Capital Cost of System on which Interest and Fixed Charges are payable for year	Average Horse Powersupplied in year after correction for power factor	Share of Operating Costs and Fixed Charges				Total Cost of Power for year as provided to be paid under Section 23 of Act	Total Revenue	Surplus or Shortage between cost of power and payments made to Commission in respect thereof in year	
	To Apr. 30, 19	To Oct. 31, 19			Operating, Maintenance and Administrative Expenses	Interest	Renewals	Con- tingencies			Surplus	Shortage
Gravenhurst....	\$ c. 12 56	\$ c. 14 00	\$ c. 41,682 57	% 359.3	\$ c. 3,202 58	\$ c. 1,806 24	\$ c. 1,458 88	\$ c. 89 82	\$ c. 6,557 52	\$ c. 4,833 48	\$ c. 1,724 04	
Huntsville	22 51	25 00	161,169 79	826.6	7,675 20	6,984 03	5,640 94	206 65	20,506 82	19,761 54	745 28	
Total Municipalities.....			202,852 36		10,877 78	8,790 27	7,099 82	296 47	27,064 34	24,595 02	2,469 32	
Muskoka Falls (Sundry Customers).....			284 01			12 30	9 93			59 00	36 77	(Applied to Contin- gency Re- serve)

MUSKOKA SYSTEM

Reserve for Renewals Account—31st October, 1919

Total provision for renewals to 31st October, 1918	\$13,031 96	
Deduct expenditures to 31st October, 1918	1,160 12	
Balance brought forward, 31st October, 1918	\$11,871 84	
Added during the year ending 31st October, 1919:		
Amount charged to Municipalities as part of the cost of power delivered to them	\$7,099 82	
Provision against equipment employed in respect of Mus- koka Falls	9 93	
Interest at 4% per annum on the monthly balances to the credit of the account	474 88	
		7,584 63
		\$19,456 47
Expenditures during the year ending 31st October, 1919		20 00
Balance carried forward, 31st October, 1919		\$19,436 47

MUSKOKA SYSTEM

Reserve for Contingency Account—31st October, 1919

Balance brought forward, 31st October, 1918		\$726 38
Added during the year:		
Amounts charged to Municipalities as part of the cost of power delivered to them	\$296 47	
Provision against equipment employed in respect of Mus- koka Falls	36 77	
Profit on sale of equipment applied to reserve for contin- gencies	7 50	
Interest at 4% per annum on monthly balances to the credit of the account	29 06	
		<u>369 80</u>
		<u>\$1,096 18</u>

MUSKOKA SYSTEM

Statement showing the Surplus or Shortage of each Municipality at 31st October, 1918, the Shortages Paid, Adjustments Made and Interest Added during the year, also the Surplus or Shortage for the year ending 31st October, 1919, and the Net Surplus or Shortage at 31st October, 1919

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918		Shortages paid and Adjustments made during the year	Interest on Surplus or Shortage at 4% per annum added during the year		Surplus or Shortage for the year ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
		Surplus	Shortage		Charged	Credited	Surplus	Shortage	Surplus	Shortage
Gravenhurst	Nov., 1915.....	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.	\$ c.
		.....	3,418 94	.....	136 75	.....	.....	1,724 04	.....	5,279 73
Huntsville	Sep., 1916.....	.....	5,437 39	.....	217 50	.....	.....	745 28	.....	6,400 17
		.....	8,856 33	.....	354 25	.....	.....	2,469 32	.....	11,679 90

RIDEAU SYSTEM

Statement showing the amount to be paid by each Municipality as the cost under section 23 of the Act, of power supplied to it by the Commission, in the year ending October 31st, 1919—the amount received by the Commission from each Municipality on account of such cost—and the surplus carried to the credit of or the shortage to be made good by each Municipality with overpayment or underpayment for the power supplied to it in the year ending 31st October, 1919.

RIDEAU

Statement Showing the Amount to be Paid by each Municipality as the Cost under Section 23
the Amount Received by the Commission from each Municipality on Account of
Good by each Municipality with Overpayment or Underpayment for

Municipality	Interim Rate per Horse Power Collected by Commission dur- ing Year	Share of Cap- ital Cost of System on which Inter- est and Fixed Charges are Payable for Year	Average Horse Power Supplied in Year after Cor- rection for Power Factor	Cost of Power to Commission
	\$ c.	\$ c.		\$ c.
Carleton Place.....	33 00	60,642 78	246.8	.....
Perth	32 00	85,397 94	145 5	2,143 87
Rideau Development (Power).....	14 00+ 543 10 per mo	75,254 76	52.6	775 03
Smith's Falls	28 00	46,347 96	385.9	6,446 71
		267,643 44	830.8	9,365 61
Non-Operating Capital		413,823 54		

SYSTEM

of the Act, of Power Supplied to it by the Commission in the Year Ending October 31, 1919—such Cost—and the Surplus Carried to the Credit of or the Shortage to be Made the Power Supplied to it in the Year Ending 31st October, 1919.

Share of Operating Costs and Fixed Charges				Total Cost of Power for Year as Provided to be Paid under Section 23 of Act	Total Revenue	Surplus or Shortage between Cost of Power and Payment Made to Commission in Respect thereof in Year	
Operating, Maintenance and Administrative Expenses	Interest	Renewals	Contingencies			Surplus	Shortage
\$ c. 3,155 31	\$ c. 1,312 92	\$ c. 681 66	\$ c. 61 70	\$ c. 5,211 59	\$ c. 8,144 12	\$ c. 2,932 53	\$ c.
884 33	3,475 40	1,804 43	36 38	8,344 41	6,625 14	.....	1,719 27
113 59	1,140 48	592 14	13 15	2,634 39	2,634 39	.....	.....
1,290 28	2,189 89	1,136 99	96 47	11,160 34	12,219 21	1,058 87	.....
5,443 51	8,118 69	4,215 22	207 70	27,350 73	29,622 86	3,991 40	1,719 27

RIDEAU SYSTEM

Reserve for Renewals Account—31st October, 1919

Total provision for Renewals:

Being amounts charged to Municipalities as part of the cost of power delivered to them, 31st October, 1919 ..	\$4,215 22	
"Reserve for Renewals" provided on second-hand equipment purchased	938 70	
Balance carried forward, 31st October, 1919		<u>\$5,153 92</u>

RIDEAU SYSTEM

Reserve for Contingencies Account—31st October, 1919

Total provision for Contingencies:

Being amounts charged Municipalities as part of the cost of power delivered to them to 31st October, 1919	<u>\$207 70</u>
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CENTRAL ONTARIO SYSTEM

Operated by The Hydro-Electric Power Commission of Ontario—Statement of Assets and Liabilities—31st October, 1919

Assets.		Liabilities.	
Central Ontario:		Provincial Treasurer:	
Power Developments and Hydraulic Rights	\$4,391,087 22	Purchase price of System	\$8,350,000 00
Transmission Lines	1,521,539 31	Debentures issued in connection with purchase of Bruton Township	
Transformer Stations	1,032,625 41	Pulpwood Area	225,000 00
Local Utilities, Electric Gas, Water and Street Railway	\$6,945,251 94	Cash advances	3,068,185 00
Nipissing:	2,022,310 16	Accounts payable	\$55,695 95
Power Development and Steam Plant	\$315,998 33	Consumers' Deposits	4,651 39
Transmission Lines	43,322 00	Unearned Water Revenue	2,074 28
Transformer Stations	35,492 22	Reserve for renewals	62,421 62
Local Utilities, electric		Reserve for contingencies	605,158 93
Rural Lines		Reserves for Sinking Fund:	5,686 27
Pulp Mill and Pulpwood Areas		For retirement of bonds issued in purchase of Bruton Township	
Cash in Bank		Pulpwood Areas	\$12,888 59
Inventories:		For repayment of cost of Mill at Bancroft	621 59
Tools and equipment	\$43,201 06	In respect of "Brooklin" Rural Lines	671 91
Materials and supplies	364,060 18		14,182 09
Accounts Receivable:			
Power and Pulpmill Accounts	\$132,203 56		
Consumers' Supply, Sales Accounts	20,324 88		
Consumers' Light and Power Accounts	35,686 50		
Less Reserve for Doubtful Accounts	3,709 29		
Work in progress, re insulation, etc.			
Advances on contracts for pulpwood			
Due by Hydro-Electric Power Commission			
Expenses and insurance prepaid			
Deferred charges			
Deferred expenses carried forward re operation of Pulp Mill and Bruton Township Pulpwood areas			
Operating deficit			
	\$12,330,633 91		\$12,330,633 91

ST LAWRENCE

Statement Showing the Amount to be Paid by Each Municipality as the Cost Under Section 23
The Amount Received by the Commission from Each Municipality on Account of
Good by Each Municipality with Overpayment or Underpayment

Municipality	Interim Rates per Horse Power Collected by Commission During Year		Share of Capital Cost of System on which Interest and Fixed Charges are Payable for Year	Average Horse Power Supplied in Year after Correction for Power Factor		Cost of Power to Commission
	To Apr. 30, '19	To Oct. 31 '19		Nov. 1 to Apr. 30	May 1 to Oct. 31	
Brockville.....	\$ c. 30 00	\$ c. 45 19	\$ c. 286,383 53	312.6	950.0	\$ c. 8,538 67
Chesterville.....	46 00	76 73	70,382 11	92.5	150.6	1,562 53
Prescott.....	25 00	44 93	51,108 07	201.7	181.2	2,319 86
Williamsburg.....	30 00	50 00	5,890 60	22.4	21.7	308 10
Winchester.....	43 00	69 84	30,028 55	67.9	75.6	888 81
Total—Municipalities			443,792 86	697.1	1,379.1	13,617 97
Total—Companies....			63,525 54	.....	210.3	1,553 53
Totals.....			507,318 40	697.1	1,589.4	15,171 50

SYSTEM

of the Act, of Power Supplied to it by the Commission in the year Ending October 31st, 1919—
Such Cost—and the Surplus Carried to the Credit of or the Shortage to be Made
for the Power Supplied to it in the Year Ending 31st October, 1919.

Share of Operating Costs and Fixed Charges				Total Cost of Power for Year as Pro- vided to be Paid Under Sec. 23 of Act	Total Revenue	Surplus or Short- age Between Cost of Power and Payment Made to Com- mission in Respect Thereof in Year	
Operating Maintenance and Admin- istrative Expenses	Interest	Renewals	Contingen- cies			Surplus	Shortage
\$ c. 5,622 50	\$ c. 8,288 73	\$ c. 7,651 12	\$ c. 237 50	\$ c. 30,338 52	\$ c. 26,004 62	.....	\$ c. 4,333 90
1,941 36	2,208 02	2,038 17	37 66	7,787 74	7,623 38	.....	164 36
1,296 40	1,787,32	1,649 84	45 30	7,098 72	6,476 41	.....	622 31
240 88	254 86	235 26	5 42	1,044 52	876 75	.....	167 77
1,023 42	958 43	884 70	18 90	3,774 26	4,098 48	324 22	.....
10,124 56	13,497 36	12,459 09	344 78	50,043 76	45,079 64	324 22	5,288 34
1,161 73	1,204 31	1,111 67	52 57	5,033 81	3,969 00	.....	1,114 81
11,286 29	14,701 67	13,570 76	397 35	55,127 57	49,048 64	324 22	6,403 15

ST. LAWRENCE SYSTEM

Reserve for Renewals Account—31st October, 1919

Balance brought forward 31st October, 1918		\$32,534 17
Added during the year ending 31st October, 1919:		
Amount charged to Municipalities as part of the cost of power delivered to them	\$12,459 09	
Provision against equipment employed in respect of contracts with Companies	1,111 67	
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	1,301 37	
		<u>14,872 13</u>
		\$47,406 30
Expenditures during the year ending 31st October, 1919		<u>479 03</u>
		<u>\$46,927 27</u>

ST. LAWRENCE SYSTEM

Reserve for Contingencies Account—31st October, 1919

Balance brought forward 31st October, 1918		\$353 47
Added during the year ending 31st October, 1919:		
Amount charged to Municipalities as part of the cost of power delivered to them	\$344 78	
Provision against equipment employed in respect of contracts with Companies	52 57	
	<hr/>	\$397 35
Profit on sale of equipment applied to Reserve for Contingencies	\$1,905 10	
Deduct losses for the year on power sold to Private Company	1,114 81	
	<hr/>	790 29
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	14 13	
	<hr/>	1,201 77
		<hr/>
		<u>\$1,555 24</u>

ST. LAWRENCE SYSTEM

Statement showing the Surplus or Shortage of each Municipality at 31st October, 1918, the shortages paid, adjustments made, and interest added during the year; also the surplus or shortage for the year ending 31st October, 1919, and the net surplus or shortage at 31st October, 1919

Municipality	Date Commenced Operation	Surplus or Shortage at October 31, 1918		Shortages paid and Adjustments made during the year	Interest on Surplus or Shortage at 4% per Annum Added During the Year		Surplus or Shortage for the Year Ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
		Surplus	Shortage		Charged	Credited	Surplus	Shortage	Surplus	Shortage
Brockville.....	Apr., 1915	.....	\$ 6,031 55	.....	\$ 241 26	.....	.....	\$ 4,333 90	.....	\$ 10,606 71
Chesterville.....	Mar., 1914	.....	7,694 28	.....	307 77	.....	.....	164 36	.....	8,166 41
Prescott.....	Dec., 1913	.....	1,746 02	.....	69 84	.....	.....	622 31	.....	2,438 17
Williamsburg.....	Apr., 1915	.....	1,162 01	.....	46 48	.....	.....	167 77	.....	1,376 26
Winchester.....	Jan., 1914	.....	4,679 50	.....	187 18	.....	324 22	.....	.....	4,542 46
		.....	21,313 36	.....	852 53	.....	324 22	5,288 34	.....	27,130 01

THUNDER BAY SYSTEM

Statement showing the Amount to be paid by each Municipality as the cost under section 23 of the Act, of power supplied to it by the Commission in the year ending October 31st, 1919, the Amount received by the Commission from each Municipality on account of such cost, and the Surplus carried to the credit of or the Shortage to be made good by each Municipality with overpayment or underpayment for the power supplied to it in the year ending 31st October, 1919.

THUNDER BAY

Statement showing the amount to be paid by each Municipality as the cost under section 23 of amount received by the Commission from each Municipality on account of such cost—
cipality with overpayment or underpayment for the power

Municipality	Interim Rate per Horse Power Collected by Commission during year	Share of Capital Cost of System on which Interest and Fixed Chgs. are payable for year	Average Horse Power supplied in year after correction for power factor	Cost of Power to Commission	Operating Maintenance and Administrative Expenses
Port Arthur.....	\$ c. 19 75 *516 77	\$ c. 117,575 66	4,565.4	\$ c. 68,406 25	\$ c. 7,546 50

*Per month

SYSTEM

the Act, of power supplied to it by the Commission in the year ending October 31, 1919,—the and the surplus carried to the credit of or the shortage to be made good by each Muni-supplied to it in the year ending 31st October, 1919

Interest	Renewals	Contingen- cies	Sinking Fund	Total Cost of Power for year as provided to be paid under Section 23 of Act	Total Revenue	Surplus or Shortage between Cost of Power and payment made to Commission in respect thereof in year	
						Surplus	Shortage
\$ c. 5,094 93	\$ c. 4,115 12	\$ c. 1,141 35	\$ c. 2,116 33	\$ c. 88,420 48	\$ c. 96,373 61	\$ c. 7,953 13	\$ c.

THUNDER BAY SYSTEM

Reserve for Renewals Account—31st October, 1919

Balance brought forward 31st October, 1918		\$28,937 47
Added during the year ending 31st October, 1919:		
Amount charged Port Arthur as part of the cost of power delivered to them	\$4,115 12	
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	1,157 50	
		5,272 62
Expenditures during the year ending 31st October, 1919		\$34,210 09
		9 75
Balance carried forward, 31st October, 1919		\$34,200 34

THUNDER BAY SYSTEM

Reserve for Contingencies Account—31st October, 1919

Balance brought forward 31st October, 1918		\$1,585 49
Added during the year ending 31st October, 1919:		
Amount charged to Port Arthur as part of the cost of power delivered to them	\$1,141 35	
Interest at 4 per cent. per annum on the monthly balances to the credit of the account	63 42	1,204 77
		<hr/>
		\$2,790 26
Expenditures during the year ending 31st October, 1919		13 90
		<hr/>
Balance carried forward 31st October, 1919		\$2,776 36
		<hr/>

THUNDER BAY

Statement showing the total Sinking Fund requirements of each Municipality ; Sinking section 23 of the Act ; Sinking Fund payments made by certain Municipalities Fund payments, including interest

Municipality	Sinking Fund Requirements		Sinking Fund Requirements Payments Deferred	
	Period Covered	Amount	Period Covered	Amount
Port Arthur	1911 to 1919 inclusive	\$ c. 15,305 26	\$ c.	\$ c.

THUNDER BAY

Statement showing the Surplus or Shortage of each Municipality at 31st October, also the Surplus or Shortage for the year ending 31st October,

Municipality	Date commenced operation	Surplus or Shortage at October 31, 1918		Shortages paid and Adjustments made during the year
		Surplus	Shortage	
Port Arthur	Dec., 1910	\$ c. 9,296 72	\$ c.	\$ c.

SYSTEM

Fund requirements the payments of which have been deferred by the Commission under who have been operating more than five years; and the total of the Sinking allowed thereon to October 31, 1919

Sinking Fund Charged or Paid		Interest at 4% per annum allowed on Sinking Fund Payments	Total Sinking Fund Payments and Accumulated Interest to October 31, 1919
Period Covered	Amount		
1911 to 1919	\$ c. 15,325 26	\$ c. 2,305 16	\$ c. 17,610 42

SYSTEM

1918; the Shortages Paid, Adjustments Made and Interest Added during the year; 1919, and the Net Surplus or Shortage at 31st October, 1919

Interest on Surplus or Shortage at 4% per annum added during the year		Surplus or Shortage for the year ending October 31, 1919		Net Surplus or Shortage on October 31, 1919	
Charged	Credited	Surplus	Shortage	Surplus	Shortage
\$ c.	\$ c. 371 87	\$ c. 7,953 13	\$ c.	\$ c. 17,621 72	\$ c.

SECTION IV

ELECTRICAL ENGINEERING AND CONSTRUCTION

ILLUMINATION OF NIAGARA FALLS

In order to fittingly commemorate the visit of H.R.H. the Prince of Wales to Niagara Falls on October 18, 1919, it was decided that the Horseshoe Falls should be illuminated. It was further decided that the installation should be semi-permanent and that arrangements should be made so that the illumination could be inaugurated and the lights turned on for the first time by the Prince.

An installation of 81 floodlight projectors was therefore made on the roof of the Ontario Power Company's Generating Station with an auxiliary battery of 10 projectors on top of the Table Rock House. These projectors were trained upon the Horseshoe Falls and adjusted to give as even an illumination as possible from Goat Island to the Canadian side of the Falls.

To supply the power for these projectors, a bank of three 30-kv-a., 2,200/115-volt transformers was installed upon the roof of the generating station and power was supplied to them through a 3-conductor, P.I.L.C. cable from the 2,200-volt service-bus in the station.

An appropriately engraved, silver mounted, souvenir push button was installed on the lawn at Dr. Grant's house, and connected by way of a Bell Telephone circuit with a bell relay in the Ontario Power Company's Station.

At 11.35 p.m., on October 18th, the Prince pushed the button, and immediately the Horseshoe Falls flashed into view.

The Prince expressed himself as highly pleased with the effect.

ONTARIO POWER COMPANY OF NIAGARA FALLS

General

The greater part of the past year was taken up in completing the work of the extension for No. 15 and No. 16 generating units, in accordance with the plans outlined in last year's Report. In addition, a considerable amount of electrical engineering of a general nature was carried on by the engineering staff of the Commission, such being necessitated by the great increase in the capacity of the system during recent years. This investigation formed a basis on which to make recommendations for the replacement of worn-out obsolete equipment, for the remodelling of the electrical layout of the plant in order to keep pace with the changing operating conditions, and for the provision of further protection of the equipment.

Generating Station

Temporary Installation of Synchronous Condenser

The first 15,000-kv-a. generator being delivered at the plant by the end of October, 1918, it was immediately erected upon temporary foundations in the north end of the existing generating station for use as a synchronous condenser.



Fig. 1—Units in place on the Roof of the Table Rock House



Fig. 2—Arrangement of Units on the Roof of Ontario Power Company's Plant



Fig. 3.—The Horseshoe Falls at Niagara—Illuminated by the Commission



Fig. 4—Completed building extension to the Ontario Power Company's plant

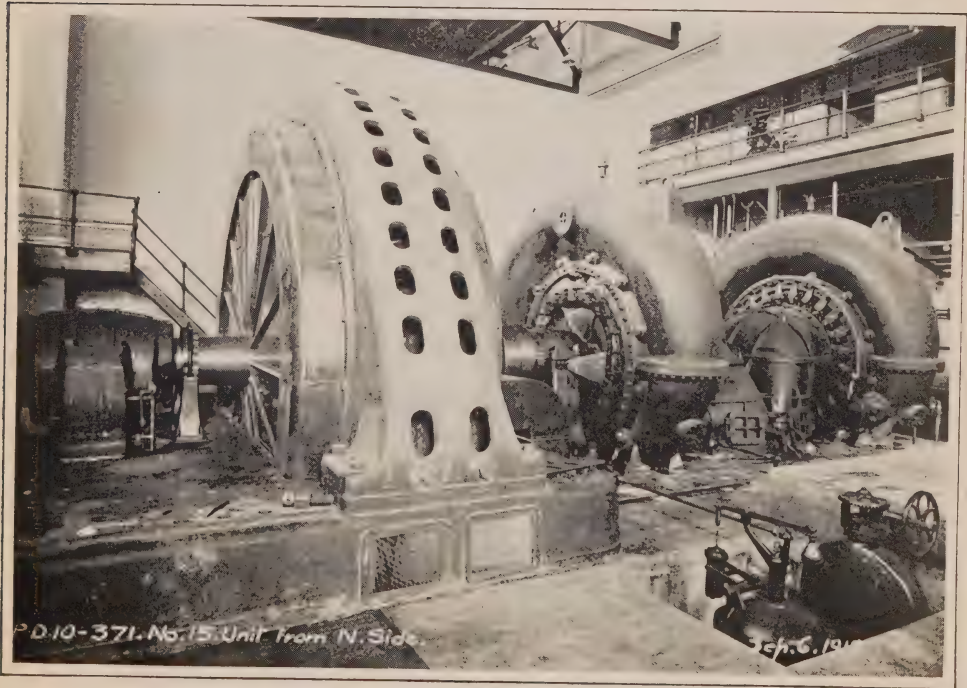


Fig. 5—No. 15 Generating Unit Complete



Fig. 6—Ventilating Chamber



Fig. 7—Ventilating Blowers

The unit was erected, dried out, tested and put into operation on December 6th, and remained in operation as a condenser until July 9, 1919.

It proved to be of great assistance in the operation of the plant, supplying about 12,000 reactive kilovolt-amperes to the 12,000-volt bus which feeds the local industrial load.

Extension for No. 15 and No. 16 Units

The completed extension of the building is shown in Figure 4, extending from the tail race wing wall.

On April 8th, the extension had been so far completed as to allow starting the erection of No. 15 turbine, and as the half of the concrete roof slab covering this section was completed on April 16th, erection of No. 15 generator was commenced on April 22nd.

The remaining section of the roof slab was poured on April 25th, thus completing the major portion of the work upon this building.

The generator cable installation for No. 15 was completed and tested at 30,000 volts, for five minutes, on May 19th.

The machine was sufficiently completed to be put on drying out run on June 8th, and was dried out and tested at 25,000 volts for one minute, between phases and all phases to ground on June 14th. This generator was put into commercial operation on June 19th. Figure 5 shows the completed unit.

Figure 6 shows the air chamber and the intakes of the ventilating blowers, with their direct-connected 35 horse-power motors, for No. 15 and No. 16 generators. Figure 7 shows the duplicate blowers for No. 15 generator. This ventilating system, which was described in detail in last year's Report, proved to be very effective in cooling the generators.

The switching equipment and cables, as described in detail in the last Report, were installed, tested and placed in operation with the generators.

Removal of Synchronous Condenser

On July 9th was commenced the work of dismantling and moving No. 16 generator from its temporary position as a synchronous condenser in the older part of the station, to its permanent position in No. 16 unit. It was estimated that about 40 days would be required to get No. 16 generator dismantled, moved, re-erected, and ready to turn over by its turbine. However, by carrying on over time, this work was completed in 28 days, and No. 16 unit was ready to turn over and was put on drying out run on August 6th. On August 11th, the drying out was completed and high potential test applied, and the unit was put into commercial operation on August 12th.

Ventilating Monitors

In an endeavor to improve the ventilation of the older section of the power house and thus decrease the operating temperature of the first fourteen generators in the plant, it was decided to install three ventilating monitors in the roof.

Accordingly, three 5-horse-power motor-driven exhaust fans were ordered and the necessary cuts were made in the roof and structures built over them. Owing

to pressure of other work, the motor-driven fans were not installed in time for the hot weather, however, a very noticeable improvement in the temperature of the power house was effected by the openings in the roof.

Distributing Station

Work on the bus and switch structures and equipment in the Distributing Station was carried on concurrently with the work at the Generating Station, so that by the time No. 15 and No. 16 units were ready to carry load they could be connected to the proper 12,000-volt busses. Instead of the installation of the bus reactors, as outlined in last year's Report, a direct extension of the "Yellow" and "Green" buses was made, with provision for the installation of bus reactors in the future, if so desired.

One 1,400-ampere capacity new feeder section was completed and put into service, and the remaining feeder section is being completed for a proposed re-arrangement of feeders.

QUEENSTON GENERATING STATION

Generating Units

On February 7th the contract was given to the Canadian Westinghouse Company, Ltd., Hamilton, for two 45,000-kv-a., 80 per cent. power factor, 12,000-volt, three-phase, 25-cycle, 187.5-r.p.m. generating units complete with thrust bearing, two guide bearings, direct-connected exciter, voltage regulator and accessories. The contract dates for completion of these two units ready for operation, are February 1, 1921 and May 1, 1921.

These generating units will be the largest of the water-wheel type in the world. They are guaranteed to deliver 45,000-kv-a. at 80 per cent. power factor (current lagging) with temperatures not exceeding 110°C. The insulation is further guaranteed not to deteriorate with temperature of 150°C. in the windings. Each generator will require 115,000 cubic feet of cooling air per minute. The generator frame is 25 feet in diameter and the total weight of the generator with its direct-connected exciter and thrust bearing is approximately 1,380,000 pounds.

The temperature of the armature windings will be observed by means of 24 thermocouples distributed throughout the armature. Two guide bearings are provided, and a Kingsbury water-cooled thrust bearing will be mounted on the upper bearing bracket to carry the entire weight of rotating parts of the generator and turbine, and to also take the water thrust of the turbine. This thrust bearing is guaranteed to carry 965,000 pounds. The generator rotating part weighs 615,000 pounds and to enable this part to be handled in the station two 150-ton electrically-operated cranes will be installed, and the shaft of the generator is provided with a groove immediately above the upper guide-bearing to permit a lifting beam to be attached so that this heavy rotor may be lifted vertically by the two cranes, and moved to and from the erection floor.

The generator is designed and guaranteed for an overspeed of 347 r.p.m. It is also guaranteed to withstand short circuits. The armature windings will be tested after erection at a potential of 30,000 volts between phases and to "ground" for one minute.

The direct-connected exciter is rated at 175 kw. at 250 volts and will be capable of exciting the generator under all load conditions.

Specifications are in course of preparation covering two additional generating units of the same rating as the two under contract. Specifications for the two 150-ton cranes and for thirteen 15,000-kv-a., 12,000-63,500-volt single-phase transformers are also being prepared. Three 15,000-kv-a. transformers will constitute a bank, and will have low-tension windings connected in delta, and high-tension windings in star to obtain 110,000 volts. The transformers will be of the water-cooled type.

It is proposed to instal two smaller generators to furnish power required to operate the plant auxiliaries such as pumps, fans, cranes, etc.

Studies have been made to determine the best system of station connections so as to limit the short circuit currents and to obtain the best operating conditions. Due to the large amount of power to be generated, suitable oil circuit-breakers will have to be developed, and conferences have been held with the manufacturers to discuss the problems involved in the construction of the circuit breakers, the bus bar supports and other switching equipment.

The general scheme is to have one generator, one bank of transformers, and one transmission line constitute an operating unit, with provision for paralleling such units either on the high or low tension sides. The number of such units that may be paralleled is dependent upon the design of oil circuit-breakers adopted and considerations of operation and safety in concentrating such large generating units on the buses.

Designs for the building are now being prepared. The generators, transformers and the switching equipment will be placed in one building, with the transformers located so as to be convenient for handling with the generator room crane. A railway track into the generating room will be installed to permit cars, loaded with apparatus, to be brought directly to the erection floor.

Whirlpool Distributing Station

The plans for the extension to this station, which were referred to in last year's Report, were completed the latter part of 1918. The construction of this extension was started in December, 1918. The additional equipment was installed and placed in operation on June 9, 1919, this work having been done by the Commission's Construction Department.

This station now contains three 1,500-kv-a., 3-phase, 12,000/4,000-volt transformers, four banks, each consisting of three 200-kv-a., 4,000/575-volt transformers and six 500-kv-a., 600-volt, direct-current rotary converters. There are five 600-volt, direct-current feeders and four 4,000-volt alternating-current outgoing feeders, with the necessary switching equipment. The 575-volt alternating-current power is supplied to the air-compressor plant which is installed in this building.

Montrose Distributing Station

In the latter part of November, 1918, a contract was let to the C.E.A. Carr Company, Toronto, for three 500-kw., 600-volt rotary converters, with 13,200-volt and 600-volt direct current switching equipment. This is to replace the equipment which was originally purchased for this station, but which was used at Whirlpool Station. Plans for the construction of this station have been completed and construction work was started in August, 1919. It is expected that this station will be ready for service the latter part of the year.

In order to supply water for cooling purposes, a water supply pipe line is being built from Niagara Transformer Station to Montrose Distributing Station.

Chippawa Temporary Sub-Station

In order to supply the Village of Chippawa with power, instructions were issued in July, 1919, to install temporary equipment for a 4,000-volt feeder in Chippawa Temporary Sub-station, which is a station used for construction purposes on the Queenston Development. This feeder equipment was installed by the Commission's Construction Department, and was put into service on August 27th.

When the work on the construction of the Canal for the Queenston Development is completed, the Chippawa Temporary Sub-Station will probably be dismantled, and it is proposed to erect at this future date a 12,000-volt to 14,000-volt, pole-type station to supply the Village of Chippawa.

NIAGARA SYSTEM

Synchronous Condenser

On account of the conditions prevailing on the Niagara System, it was decided, during the summer of 1919, after investigation and study, that another large capacity synchronous condenser should be connected to the system.

Accordingly, tenders were called for, and on August 6th, a contract was placed with the Canadian General Electric Company for one 10,000 kv-a., self-starting synchronous condenser 13,200-volts, 3-phase, 25-cycles, 375-r.p.m., having a continuous overload rating of 13,000-kv-a., at both 12,000 and 13,200 volts, and guaranteed to operate safely up to an ultimate temperature of 150°C.

A direct-connected, 80-kw., 125-volt exciter, an auto transformer and a motor-driven high pressure oil-pump with a piping system to the machine bearings for starting purposes, are including in the contract. The contract date for the delivery of this machine is March 20, 1920.

A point of interest is the manufacturer's statement that the pole-pieces and field-coils for this machine will be the largest so far constructed in Canada.

NIAGARA TRANSFORMER STATION

Additional Transformer Equipment

The installation of No. 1 bank of transformers, which consists of three 7,500-kv-a., 12,000-63,500-volt units, which were mentioned in last year's Report, was completed and put into service on January 8, 1919.

Plans are being prepared for the installation of a bank of three 75-kv-a., 12,000/575-volt transformers, which will be used as reserves for station service.

Switching Equipment, 12,000 Volts

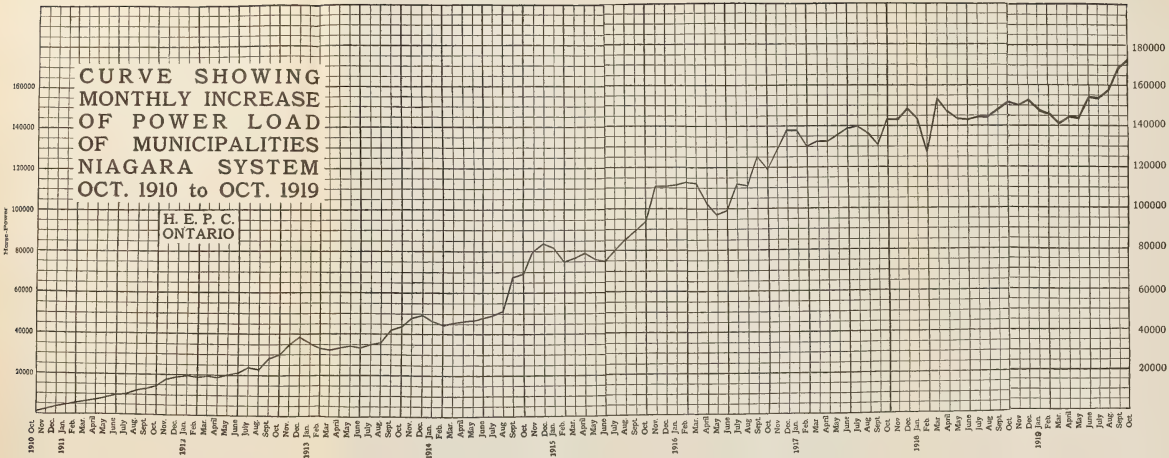
The rebuilding of the 12,000-volt auxiliary bus structure complete with switching equipment for No. 1 Ontario Power Company's feeder and No. 1 bank of 110,000-volt transformers, which was mentioned in last year's Report, was completed and put into service on December 27, 1918.

The 12,000-volt auxiliary bus structure and equipment for No. 2 and No. 3 banks of 110,000-volt transformers and for No. 2 and No. 3 Ontario Power Company feeders, which was installed in the original installation, has been completely taken out and new bus structures have been built. New bus and switching equipment of the latest improved type has been installed on these structures. No. 2 structure was put into service May 28, 1919, and No. 3 structure was put into service October 7, 1919.

CURVE SHOWING MONTHLY INCREASE OF POWER LOAD OF MUNICIPALITIES NIAGARA SYSTEM OCT. 1910 to OCT. 1919

H. E. P. C.
ONTARIO

Horse-Power



Switching Equipment, 110,000 Volts

The 110,000-volt oil circuit-breakers for the four lines to Dundas, which were mentioned in last year's Report, were all installed and put into service during the first half of this year.

12,000 Volt Feeders

No. 1 feeder from the Ontario Power Company, which consists of four 350,000-c.m., three-conductor, paper-insulated, lead-covered, armored cables was installed during the latter part of 1918; and put into service on December 27, 1918.

Protection of Service

The neutral resistances for the 110,000-volt and 46,000-volt outgoing lines were completed and put into service in November, 1918. These have been enclosed by a temporary wooden building. These neutral resistances have to date proved entirely satisfactory.

The new storage battery has been installed to improve the operation of the oil circuit-breakers. This battery replaced the one originally installed in the station, which was removed to Stratford Transformer Station. Additional cells are being added to the other battery so that it will have increased capacity and may be used with the new battery.

Switchboard

The rearrangement of the switchboard, as stated in last year's Report, has been partially completed, and it is expected that this work will be finished in the early part of 1920.

The totalizing metering equipment for the 46,000 and 110,000-volt loads, the "C.N.P." and the "O.P." incoming power is being installed. This metering equipment for the 110,000-volt load was put into service on September 15, 1919. It is expected that the balance of this equipment will go into service the latter part of 1919.

Water and Oil Systems

The new water supply from the Ontario Power Company's line which was mentioned in last year's Report was completed in the spring of 1919. This provides an adequate supply of cold water for cooling purposes.

General

The septic tank which was started last autumn was completed and put into service in December, 1918. The drainage system inside, as well as outside the station has been improved so as to give proper drainage. A new roadway has been made along the south end of the station and along the east side of the 1913 and 1916 extensions. The grounds around the station have been graded and are to be seeded.

The ventilating system, in order to cool the section of the station where set "A" reactors are installed, has been completed and was put into service in June, 1919.

A concrete floor has been laid in the basement of the 1916 building. This is being used as a store and work shop for the Construction Department.

National Abrasive Company, Niagara Falls

Metering Equipment

Instructions were received in January, 1919, to supply and instal metering equipment in the sub-station of the National Abrasive Company at Niagara Falls, to meter power supplied to that company. The equipment that was required for this installation was obtained from reserve stock and was installed by the Commission's Construction Department. This metering equipment was ready for service on February 19, 1919. Power was supplied to this station from the Ontario Power Company's 12,000-volt lines, but due to the supply of power to this company being discontinued by the Commission, the equipment referred to above was completely removed in July from the company's sub-station.

Thorold Distributing Station

Instructions were received in March, 1919, to install new feeder equipment on one of the 4,000-volt feeders in Thorold Distributing Station, which was acquired by the Commission in the latter part of 1918. This feeder equipment was installed by the Commission's Construction Department and was ready for service on May 18, 1919.

Welland Municipal Station

Engineering assistance to the Welland Hydro-Electric Commission was given, at their request, covering the inspection and tests on 1,500-kv-a., 3-phase, 45,700-volt transformers.

DUNDAS TRANSFORMER STATION

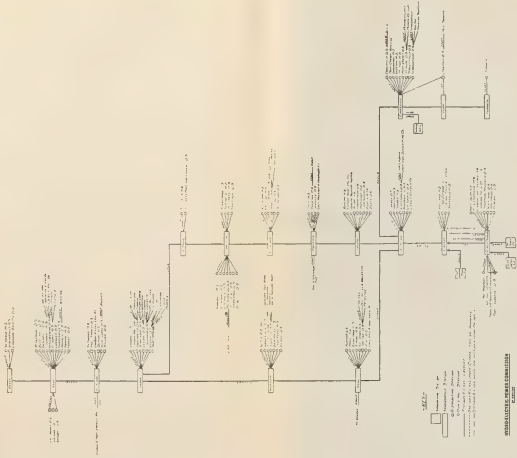
High-Tension Equipment

The installation of the Canadian General Electric type K-15, 110,000-volt oil circuit-breaker on the No. 2 transformer bank feeder mentioned in the last Report, was completed in February, 1919, replacing the original Canadian Westinghouse type "GA" oil circuit-breaker which was removed and placed in storage at this station.

On account of the heavy service required on the 110,000-volt lines out of Dundas Station, it was decided to replace the original Canadian Westinghouse "GA" oil circuit-breakers on all these lines with heavier capacity breakers. Three Canadian Westinghouse plain round tank 400-ampere oil circuit-breakers with 400-ampere bushing type current transformers were purchased for use on the "F1," "C1" and "C2" lines, and two Canadian Westinghouse 400-ampere, oval tank reactance oil circuit-breakers with 400-ampere current transformers originally installed in Niagara Transformer Station, were transferred to Dundas Transformer Station, for use on the "B1" and "B2" lines. Plans have been prepared showing the necessary changes required to instal these breakers, and the installation work, which is now being done by the Commission's Construction Department, will be completed about the last of December, 1919. The old oil circuit-breakers, as they are removed from service, are being shipped to the Canadian Westinghouse Company's factory to be rebuilt and reinforced to increase their capacity.

Low-Tension Equipment

As the flat choke coils on two 13,200-volt Hamilton feeders were found to be too light to carry the current, new spiral choke coils of heavier capacity were obtained and installed on these feeders in March, 1919.



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511

Dispersal Strategy - 20 minutes

— 17 —

Add'l. 2.

100

As it was desired to obtain direct records of the total load in this station, plans have been prepared and instructions issued to parallel the 13,200-volt current transformers of each transformer bank on two 10-5/5-ampere current transformers from which leads are taken through a Westinghouse graphic recording meter and a Westinghouse recording, reactive volt-ampere meter to give the total load. Westinghouse type C polyphase watthour meters are also being installed on the leads of each transformer bank. This work is being done by the Commission's Operating Department, and is expected to be completed in November, 1919.

As it was considered advisable, due to the importance of this station, to have better relay protection on the 13,200-volt feeders, new Condit type A inverse definite time-limit relays were purchased and installed on these feeders in April, 1919, replacing the old Canadian Westinghouse type "B" relays, which were removed and shipped into the Toronto Stores.

General

The oil and air piping to the two banks of 2,500-kv-a. transformers mentioned in the last Report, was completed early in 1919.

Owing to considerable trouble being experienced with style B telephone entrance cables into this station, two 15-pair, lead covered cables were purchased and installed in conduit, and telephone horn gap surge protectors were also installed, the work being completed in April, 1919.

The installation of the 10-kw. motor generator set and the electric heaters, mentioned in the last Report, was completed in January, 1919, with necessary changes in connections.

Lynden Distributing Station

Owing to the importance of the load on the Lynden feeder in the Lynden Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Hagersville Distributing Station

Owing to the importance of the load on the Hagersville feeder in the Hagersville Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Lythmore Distributing Station

Owing to the importance of the load on the Crown Gypsum Company feeder in the Lythmore Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Caledonia Distributing Station

Owing to the importance of the load on the Alabastine Company feeder in the Caledonia Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same

on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Dominion Sewer Pipe Company Distributing Station, Waterdown

In July, it was decided to remove the present recording wattmeters from the Waterdown and Dominion Sewer Pipe Company's feeders in this station, and to purchase for and instal on each of these feeders a Westinghouse recording wattmeter and a recording reactive volt-ampere meter.

The new meters will be delivered in December, 1919, and the installation completed early in 1920.

Wood Milling Company, Copetown

The installation in the Wood Milling Company's mill of a Westinghouse graphic wattmeter and instrument transformers to measure the power at 550 volts was authorized in September.

This meter was obtained from the Niagara Transformer Station, and will be installed and placed in service in November, 1919.

TORONTO TRANSFORMER STATION

Transformers

The three 5,000-kv-a. transformers were installed to replace the 2,500-kv-a. transformers in No. 3 bank on December, 20, 1918.

The six 2,500-kv-a. transformers which were removed from No. 3 and No. 4 banks and stored outside the station were transferred to London Transformer Station, the three from No. 3 bank being shipped in July, and the three from No. 4 bank in September.

Annunciator

In April, at the suggestion of the Toronto Hydro-Electric System, arrangements were made to have an annunciator installed to indicate the oil circuit-breakers opening automatically. Several changes are also to be made in the control wiring to facilitate the locating of trouble. All material for this work is being supplied by the Toronto Hydro-Electric System, the work in connection with the local system's breakers is being carried out by their men, but that affecting the Commission's breakers is being done by the Operating Department of the Commission.

It is expected that the annunciator will be delivered in December, 1919, and the other work referred to will then be completed.

Synchronous Condensers

In the last Report, reference was made to the re-insulating of the coils of No. 2 synchronous condenser. The re-winding of the armature was completed and the condenser was placed in service on November 18, 1918. Operation proved unsatisfactory, however, and it was decided to obtain a new winding of increased capacity.

On April 28th a contract was awarded to the Canadian General Electric Company for a complete new set of armature coils for this condenser, and the work of re-winding the armature, at their factory at Peterboro, this new winding being designed to increase the capacity of the machine from 4,000 to 5,000-kv-a.

The stator of the condenser was shipped to Peterboro in August, and it is expected that it will be returned to Toronto and that the condenser will be placed in service in November.

On December 11th, 1918, an order was placed with Leeds and Northup Company, Philadelphia, Pennsylvania, for a portable temperature indicator, to be used with temperature detector coils embedded in the winding. At present, these detector coils have been installed in No. 2 condenser only.

LONDON TRANSFORMER STATION

The load conditions at London Transformer Station necessitated the increasing of the transformer capacity, and it was decided in May, to ship to London and instal in the spare transformer pocket, three of the 2,500-kv-a. transformers which were removed from Toronto Station in 1918, and which were stored at Toronto.

These transformers were loaded on the cars at Toronto in July, and were unloaded and moved to London Transformer Station by the Construction Department of the Commission. These transformers are now in No. 3 pocket ready to be connected up, which will be done at an early date.

In June, it was decided to ship to London the remaining three 2,500-kv-a. transformers stored at Toronto, and to instal these in No. 1 pocket, replacing the 1,250-kv-a. shell type transformers, one of which, along with the spare 1,250-kv-a. unit, was to be shipped to York Temporary Transformer Station. The other two transformers from No. 1 bank were to be stored at London, pending transfer to another station.

In August, the spare 1,250-kv-a. transformer was removed from London Transformer Station and shipped to York Temporary Transformer Station, and in September, the second three 2,500-kv-a. transformers were loaded on the cars at Toronto and shipped to London. All work in connection with the handling of these four transformers was done by the Construction Department.

On October 26th, the three 1,250-kv-a. transformers in No. 1 pocket were replaced by the three 2,500-kv-a. transformers without interruption to service. The transfer of the three 1,250-kv-a., core type transformers from No. 2 pocket to Woodstock Transformer Station is being considered.

Complete high-tension and low-tension switching equipment was required for the transformers in the spare, or No. 3 pocket, and was obtained as follows: The 110,000-volt breaker was transferred from Toronto Transformer Station in July, having been removed from service there in 1918; the 110,000-volt disconnecting switches, and 110,000-volt insulators were purchased on stock orders from the Canadian Westinghouse Company and the Ohio Brass Company, respectively; the 13,200-volt breaker was purchased from the Railway and Power Engineering Corporation, Toronto, and the 13,200-volt insulators and the switchboard panel were purchased from the Canadian General Electric Company.

In order to provide better protection for the transformers it was decided to instal differential relays on each of the two banks of 2,500-kv-a. transformers. The high-tension current transformers required to operate these relays are being manufactured by the Commission.

As in the case of all our 110,000-volt stations on the Niagara System, graphic meters are being installed to record the total station load at London. Two graphic wattmeters have been ordered from the Canadian Westinghouse Company for this purpose.

London Municipal Station

The erection of the extension to the Horton Street Station, which it was stated in the last Report, would be undertaken in 1919, has been postponed until the spring of 1920. The switching equipment, ordered from the Canadian Westinghouse Company and referred to in the last Report, has not been shipped, but a number of the 13,200-volt disconnecting switches and oil circuit-breakers have been inspected and tested by the Commission's engineer at the Canadian Westinghouse Company's factory. All the switching equipment will be shipped early in 1920.

Lucan Distributing Station

Owing to the importance of the load on the Lucan feeder in the Lucan Distributing Station, the purchase and installation of a Westinghouse recording, reactive volt-ampere meter with its necessary equipment on this feeder, was authorized in July.

It was also decided, in October, to transfer the complete 4,000-volt feeder equipment supplying Ailsa Craig and Parkhill to the new distributing station being built at Ailsa Craig.

These changes will be completed early in 1920.

Ailsa Craig Distributing Station

Instructions were received in August for the construction of a modified type "E" distributing station at Ailsa Craig with 4,000-volt feeders to Parkhill and Ailsa Craig. Plans and specifications were prepared and the building is to be erected by the Commission and will be completed in the latter part of November.

The station will be fed by one 13,200-volt incoming line through "H.E.P.C." standard air-break switch and fuses and Canadian Westinghouse choke coils, and will be equipped with Delta Star outdoor type lightning arresters. The transformer equipment will consist of one bank of three 75-kv-a., single-phase, 25-cycle, 13,200/2,300-575-volt, Canadian Westinghouse transformers, which are being transferred from Elmira Distributing Station. The switching equipment will consist of two outgoing 4,000-volt feeders, equipped with Garton Daniel arresters; one to supply Ailsa Craig and the other Parkhill. The Ailsa Craig feeder equipment is being purchased from the Canadian Westinghouse Company, while the Parkhill feeder equipment is to be transferred from Lucan Distributing Station, being the present Ailsa Craig 4,000-volt feeder equipment in the latter station. The metering equipment consists of Weston ammeters and voltmeter, a Westinghouse recording wattmeter on the Parkhill feeder, and a Westinghouse recording wattmeter and recording reactive volt-ampere on the Ailsa Craig feeder.

All the installation work inside the station, with the exception of the Parkhill feeder equipment and the power transformers, is to be installed by the Canadian Westinghouse Company. The erection of the pole structure, the installation of the power transformers, and the installation of the Parkhill feeder equipment and auxiliary apparatus is to be done by the Commission.

It is expected that this station will be ready for service about the end of December, 1919.

Strathroy Municipal Station

Metering Equipment

The graphic wattmeter in the Strathroy Municipal Station was the property of the Public Utilities Commission of Strathroy. In November, 1918, this watt-

meter was purchased by the Commission, and on April 24th, a graphic reactive volt-ampere meter was installed in this station by the Commission.

Exeter Distributing Station

Owing to the importance of the loads on the Exeter and Hensall feeders in the Exeter Distributing Station, the purchase and installation of a Westinghouse recording, reactive volt-ampere meter and the necessary equipment for it for each of these feeders, was authorized in July. The meters will be delivered about December, 1919, so that this installation will be completed early in 1920.

GUELPH TRANSFORMER STATION

The four 750-kv-a. Westinghouse transformers, which were removed from Guelph Transformer Station in 1918 and stored outside, were shipped to Kent Transformer Station in June. The installation of the new oil circuit-breaker for the transformer low-tension circuit, the relays, and 12-volt storage battery, referred to in the last Report, was completed in June.

In March, it was decided to instal an emergency 13,200-volt bus with disconnecting switches to connect to each feeder, and also to instal disconnecting switches on all the 13,200-volt lightning arresters. The greater part of the material required for these additions was obtained from Dundas and Niagara Transformer Stations. The installation was completed in July.

Cheltenham Distributing Station

Owing to the importance of the load on the Interprovincial Brick Company feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Georgetown Distributing Station

Owing to the importance of the load on the Georgetown feeder in the Georgetown Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Fergus Distributing Station

Owing to the importance of the load on the Fergus feeder in the Fergus Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Elora Distributing Station

Owing to the importance of the load on the Elora feeder in the Elora Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, and this installation will be completed early in 1920.

Acton Distributing Station

Owing to the importance of the load on the Acton feeder in the Acton Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Ontario Agricultural College, Guelph

Metering Equipment

It was decided in July, to purchase and instal a Westinghouse recording wattmeter and a recording reactive volt-ampere meter to measure at 13,200 volts the total load of this customer, by connecting to their instrument transformers. This installation will be completed in December, 1919.

Guelph Military Hospital Metering Equipment

(Formerly Central Prison Farm)

It was decided, in July, to purchase and instal a Westinghouse recording wattmeter and a recording reactive volt-ampere meter to measure the total load of this customer at 550 volts, by connecting to their current transformers, the potential transformers being supplied by the Commission.

This metering equipment will be installed early in 1920.

PRESTON TRANSFORMER STATION

The changes in the installation in this station, to feed Galt, and the transformers for the South Waterloo Township load at 13,200 volts from transformer bank No. 2, leaving transformer bank No. 1, and the rest of the feeders at 6,600 volts, as mentioned in the last Report, were completed and placed in service on March 9th.

Investigations are now being made regarding changing the Galt, Preston and Hespeler R.R. sub-station and the Preston and the Hespeler Municipal Stations to 13,200 volts. When this can be done, No. 1 transformer bank and the remaining feeders in this transformer station will be operated at 13,200 volts.

In order to obtain direct records of the total load on each transformer bank at this station, the purchase and installation of a Canadian Westinghouse recording wattmeter and recording reactive volt-ampere meter and two type C watthour meters with the necessary additional equipment, was authorized in July. One watthour meter is to be connected in on the 13,200-volt leads of transformer bank No. 2, and the other watthour meter and the recording wattmeters are to be connected in on the 6,600-volt leads of transformer bank No. 1. The recording wattmeter and recording reactive volt-ampere on the Galt feeders are to be used to give the load on transformer bank No. 2, until all feeders are changed to 13,200 volts, when the total load of the station will be read on one recording wattmeter and recording reactive volt-ampere meter.

The totalizing meter installation will be completed early in 1920.

KITCHENER TRANSFORMER STATION

In January, 1919, a second bank of three 5-kv-a. service transformers were installed in the Kitchener Transformer Station in the gallery adjacent to the first bank.

It was also decided to improve the automatic protection on the low-tension (13,200-volt) transformer oil switches in this station by replacing the circuit opening relays on these switches with Condit type "A" relays and direct-current tripping circuit. This change was completed in July.

In order to measure the total load on the two banks of power transformers in this station, the purchase and installation of a Westinghouse type "C" poly-phase watthour meter, recording wattmeter, and a recording reactive volt-ampere meter with necessary equipment for same, was authorized in July, 1919. The necessary station drawings have been made up for this work and the installation will be proceeded with in December.

New Hamburg Distributing Station

Owing to the importance of the load on the New Hamburg feeder in the New Hamburg Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Baden Distributing Station

Owing to the importance of the loads on the Baden and Wellesley feeders in the Baden Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on each of these feeders, was authorized in July. The meters will be delivered about December, 1919, so that this installation will be completed early in 1920.

Elmira Distributing Station

To take care of the increase in load on the Elmira Distributing Station, it was decided, in September, to purchase and instal three 150-kv-a., single-phase, 25-cycle, 26,400-13,200/2,300-575-volt Canadian General Electric transformers with necessary changes in the present installation for same, to replace the three 75-kv-a., single-phase, 25-cycle, 13,200/2,300-575-volt, Canadian Westinghouse transformers at present installed in this station. The latter, as soon as released from service, are to be transferred to the new Ailsa Craig Distributing Station.

It was also decided in July to instal a Westinghouse recording reactive volt-ampere meter on the Elmira 4,000-volt outgoing feeder.

The necessary drawings are being revised and made up to cover these changes in the above station, and it is expected to have the work completed in January, 1920.

STRATFORD TRANSFORMER STATION

A concrete floor has been erected over the new control room, with stairs leading from the control room. In the basement, a room has been partitioned off for the storage battery. An eight-inch brick wall, 17 feet high, has been erected between the high-tension room and the station service transformer room. A dressing room and a shower bath with hot and cold water have been provided in the station for the use of the operating, construction and maintenance men.

The installation of the equipment for changing the 110,000-volt and 26,400-volt oil circuit-breakers from hand-operated type to electrically-operated, the installation of the storage battery and motor-generator set, and the permanent

installation of the station service transformers is now well under way, and it is expected will be completed in February or March, 1920. This work is being done by the Construction Department of the Commission.

The motor-operated deep-well pump, for the well, referred to in the last Report, was ordered from the Luitweiler Pumping Engine Company of Rochester, New York, in July. A concrete sub-grade pumphouse has been erected by the Construction Department of the Commission. The pump has been delivered and will be put into operation at an early date.

Clinton Municipal Station

Metering Equipment

In order to obtain a more accurate indication of the load on this station, it was decided in July to purchase the present metering equipment, consisting of graphic wattmeter and graphic power factor meter with instrument transformers from the Clinton Commission, and to replace these meters with a Westinghouse recording wattmeter and a recording reactive volt-ampere meter.

The installation of the new meters will be completed early in 1920.

Seaforth Municipal Station

Metering Equipment

In order to obtain more accurate indication of the load on the above station, it was decided, in July, to purchase the present metering equipment, consisting of graphic wattmeter and graphic power factor meter with instrument transformers from the local commission, and to replace these meters with a Westinghouse recording wattmeter and a recording reactive volt-ampere meter.

The installation of the new meters will be completed early in 1920.

Mitchell Municipal Station

Metering Equipment

It was decided to replace the present Westinghouse graphic power factor meter in this station with a Westinghouse recording reactive volt-ampere meter. This change will be made early in 1920.

Listowel Distributing Station

In order to provide for the increase in load on the Listowel Distributing Station, the purchase and installation of three 200-kv-a., single-phase, 25-cycle, 26,400-13,200/2,300-575-volt Canadian General Electric transformers and the necessary changes in the present installation for same, was authorized in September to replace the three 100-kv-a., single-phase, 25-cycle, 26,400/2,300-575-volt Canadian Westinghouse transformers at present installed in this station. It was also decided to install a Westinghouse recording reactive volt-ampere meter on the Listowel 4,000-volt outgoing feeder. The necessary drawings are being revised for these changes.

It is expected to have this new equipment installed early in 1920.

Tavistock Distributing Station

Owing to the importance of the load on the Tavistock feeder in the Tavistock Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, and this installation will thus be completed early in 1920.

Milverton Distributing Station

Owing to the importance of the load on the Milverton feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, and the installation will be completed early in 1920.

WOODSTOCK TRANSFORMER STATION

The installation of separate feeder switching and metering equipment in this station for Tillsonburg, as mentioned in the last Report, was completed by the Commission's Construction Department and placed in service on October 8, 1919.

As the Woodstock Water and Light Commission decided to build a new municipal station, and wished to have a new 13,200-volt feeder to their station, plans were made and instructions issued for the installation of this feeder out of Woodstock Transformer Station. The feeder, which is protected by a new Canadian General Electric electrolytic lightning arrester, is connected through disconnecting switches and choke coils to one of the present feeders to the municipality, which runs up the wall and over to the municipal transformers in the station erection room. New current transformers were installed on the two present feeders to the municipality as a third set and the secondary leads paralleled, and carried in conduit over to a graphic recording wattmeter, installed by the local commission, on the switchboard in their municipal pumping station to give the total load taken by the municipality.

This work was done by the Commission's Construction Department, being completed and cut into service on October 31, 1919.

In order to obtain direct records of the total load on this station, the purchase and installation of Canadian Westinghouse recording wattmeter, recording reactive volt-ampere meter and watthour meter and necessary additional equipment to measure total power to this station, was authorized in July. The meters have been purchased and plans made covering this installation which will be completed early in 1920.

Woodstock Municipal Station

At the request of the Woodstock Water and Light Commission in March, plans and specifications were prepared covering a new municipal station building, and engineering assistance was given in connection with the electrical layout. The local commission erected the building and purchased and installed the electrical apparatus, the line entrance bushings and brackets and the wall ventilation being purchased from the Commission.

The building is of brick, approximately 20 by 26 by 16 feet high and designed to accommodate two banks of three 150-kv-a., 13,200/550-volt, single-phase transformers, one 13,200-volt incoming line, two 550-volt, three-phase feeders and two 2,300-volt, three-phase feeders, together with the necessary switching and metering equipment and lightning arresters. The building was completed in June and the electrical layout was completed and placed in service on October 31, 1919.

Beachville Distributing Station

The purchase and installation of a Westinghouse graphic recording reactive volt-ampere meter on the Beachville feeder panel in the above station, was decided

on in July, 1919, and drawings are being prepared to cover the necessary changes for this work.

This meter will be delivered in November and will be installed in January, 1920.

Tillsonburg Municipal Station

Metering Equipment

The purchase and installation of a Canadian General Electric 4,500-volt oil-switch on the Dereham Township rural feeder, out of the Tillsonburg Municipal Station, was authorized in May. This switch was installed for the Commission by the Tillsonburg Hydro-Electric Commission, and was placed in service in August.

It was also decided to instal a Westinghouse recording reactive volt-ampere meter on the incoming 13,200-volt line in this station. This meter will be installed early in 1920.

Norwich Distributing Station

Owing to the increase in load on the Norwich Distributing Station, it was decided to increase the transformer capacity by replacing the present three 50-kv-a., single-phase, 25-cycle, 13,200/2,300-volt Siemens transformers with three 75-kv-a., single-phase, 25-cycle, 13,200/2,300-575-volt Packard transformers, and also to change the present station layout for these. The 75-kv-a. transformers have been purchased and the station drawings revised, but the installation work has been held up pending the decision of the local commission to provide another site.

It was also decided to instal a Westinghouse recording reactive volt-ampere meter on the Norwich 2,300-volt feeder, and also to replace the Esterline graphic wattmeter on the North Norwich Township rural feeder metering equipment with a Westinghouse recording wattmeter. These new meters will be delivered in December, 1919, and will be installed early in 1920.

ST. MARY'S TRANSFORMER STATION

In July, the purchase and installation of a Westinghouse type "C" polyphase watthour meter, recording wattmeter, and recording reactive volt-ampere meter with instrument transformers and additional equipment for same to measure the total station load at 13,200 volts, was authorized.

It was also decided to replace the recording metering equipment on the St. Mary's 13,200-volt feeder with a Westinghouse recording wattmeter and recording reactive volt-ampere meter to obtain better indications of the load on this feeder.

The new equipment will be delivered and this installation completed in December, 1919.

BRANT TRANSFORMER STATION

The changes in the above station referred to in the last Report were completed, with the exception of the differential relay protection, and placed in service on November 15, 1918. Only the conduits, cables and connections for differential relay protection that could be installed without disturbing the present connection or causing an interruption were installed, as it had been decided to replace the present transformers by ones of larger capacity, requiring also larger current transformers. A number of new station lights were installed at the same time connected to the battery for emergency direct-current lighting, this work being completed as far as possible in September, 1919, by the Commission's Construction Department.

Owing to the increasing load on this station it was decided to replace the present 1,250-kv-a. transformers by a bank of 2,500-kv-a. transformers, with the necessary changes in current transformers and equipment. Accordingly, tenders were obtained and a contract was placed with the Canadian Westinghouse Company for four 2,500-kv-a., 63,500/26,400/13,200-volt, 25-cycle, single-phase, O.I.W.C. transformers in May, 1919. Plans have been prepared covering the installation of this new transformer bank with the necessary current transformers and relays for differential protection, and arrangements have also been made to have this work done in January, 1920. To enable grounds on the 26,400-volt lines to be more easily located, it was decided to instal apparatus by which these grounds could be detected at once, to show on which phase the ground occurs. For this purpose plans have been made to instal three additional potential transformers connected in star through potential fuses to the 26,400-volt station busses and the neutral grounded through a potential fuse. The secondaries of these transformers are connected in delta to three voltmeters with a shunt trip relay inserted inside the delta to ring an alarm bell in case of trouble. It is expected that this work will be completed early in 1920.

Operator's House

It was decided to erect a house to accommodate part of the operating staff at Brant Transformer Station. The house is an eight-room frame building, with one room arranged for use as an office. It has a concrete cellar, a hot-air furnace, electric lighting, modern plumbing, a septic tank and pneumatic water system, the tank being located in the transformer station basement. Sufficient water capacity is provided to take care of another house, and the location of the present house was decided with this in view. It is located on the station site, and is now being built by the Construction Department. It will be ready for occupancy by the end of December, 1919.

Waterford Distributing Station

Owing to the importance of the load on the Waterford feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for the same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Simcoe Municipal Station

Metering Equipment

In order to obtain a more accurate indication of the load on this station, it was decided, in July, to purchase the present metering equipment consisting of a graphic wattmeter with instrument transformers from the Simcoe Commission, also to install a recording reactive volt-ampere meter.

The installation of the new meters will be completed early in 1920.

Burford Distributing Station

On January 12th, the 75-kv-a., 3-phase, 25-cycle Moloney transformer referred to in the last Report was installed in place of the three 75-kv-a. Westinghouse single-phase transformers, which were transferred to Kingsville Distributing Station.

Wolverton Milling Company

Metering Equipment

Metering equipment, consisting of Canadian General Electric Company's current transformers, and Canadian Westinghouse Company's potential transformers and graphic wattmeters, was installed at the Wolverton Milling Company's plant on January 17, 1919.

Plattsville

Metering Equipment

Outdoor 4,000-volt metering equipment, consisting of Packard current and potential transformers and a Canadian Westinghouse graphic wattmeter, was installed at Plattsville on April 27, 1919.

ST. THOMAS TRANSFORMER STATION

Rotary Converter Equipment

A spare armature for the 500-kw. rotary converter at St. Thomas was purchased from the Canadian Westinghouse Company and delivered at St. Thomas transformer station February 22d.

Three sets of flash barriers for the 500-kw. 1,500-volt rotary converters were ordered from the Canadian General Electric Company in July, but have not yet been received. As soon as these are received they will be installed by the Commission's Operating Department on the three rotary converters at this station.

Metering Equipment

To obtain direct reading of the total load on this station, the purchase and installation of a Westinghouse recording wattmeter, a Westinghouse recording reactive volt-ampere meter and two Westinghouse watthour meters with necessary equipment was authorized in July. One of the watthour meters is to be installed in the 13,200-volt leads of each transformer bank, and the secondaries of current transformers on these leads are to be paralleled on two 10/5-5-ampere current transformers and connected to the recording meters to give the total load on the station. This work will be done by the Commission's Operating Department and is expected to be finished in December, 1919.

Sewage Disposal

As the original cesspool became inadequate for the accommodation of the staff at this station, a septic tank was designed and instructions issued for the building of this in 1918. This work was completed by the Commission's Operating Department and the tank put into service in July, 1919.

St. Thomas Municipal Station

The installation of a 30-kw. Canadian General Electric constant-current transformer and switching equipment for an additional lighting feeder mentioned in the last Report was completed ready for service November 28, 1918.

Aylmer Distributing Station

The purchase and installation of a Westinghouse graphic recording reactive volt-ampere meter on the Aylmer feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work.

This meter will be delivered in November and will be installed, January, 1920.

Port Stanley Distributing Station

In order to supply the increased summer load on the Port Stanley Distributing Station, it was decided in April to increase the transformer capacity of this station by replacing the three 50-kv-a., single-phase, 25-cycle, 13,200/2,300-volt Siemens transformers with three 75-kv-a., single-phase, 25-cycle 13,200/2,300-volt Siemens transformers from the Toronto Stores. The station drawings were revised accordingly, but in making the installation it was necessary to connect two of the 75-kv-a. transformers in delta with two of the 50-kv-a. transformers in parallel on one leg until the third 75-kv-a. transformer is repaired by the Commission's Operating Department.

It was also decided to instal a Westinghouse recording reactive volt-ampere meter on the Port Stanley feeder in this station.

The third 75-kv-a. transformer and the recording reactive volt-ampere meter will be installed early in 1920.

Dutton Distributing Station

Owing to the importance of the load on the Dutton feeder in the Dutton Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

COOKSVILLE TRANSFORMER STATION

The increasing of the carrying capacity of the high-tension disconnecting switches and oil circuit-breakers from 200 to 400 amperes, as outlined in the last Report, was completed June 23, 1919, the necessary switch parts and breaker contacts being supplied by the Canadian Westinghouse Company and insulators by the Ohio Brass Company.

The purchase and installation of the ten 120/5-ampère, 13,200-volt Westinghouse current transformers was decided on in March, 1919, to replace the overloaded 60/5-ampere current transformers in the Port Credit Brick Company and the Port Credit-Etobicoke feeder lines. The work was carried out by the Operating Department and the new transformers placed in service March 30, 1919.

It was also decided in September, 1919, to replace the Westinghouse graphic power factor meters on the Shale Brick Company and the Brampton feeder panels with Westinghouse graphic recording reactive volt-ampere meters. This change was completed in October, 1918.

In July, 1919, it was decided to purchase and instal a Westinghouse totalizing graphic wattmeter, graphic R.R.V.A. meter, and watthour meter, on a new panel adjacent to the transformer panel to record the total station load. Also in October, 1919, it was decided to purchase and instal electrical equipment for differential relay protection of the 1,250 kv-a. transformers. Drawings are being prepared to cover this work, and installation of this equipment should be completed early in 1920. Air-insulated current transformers of 25 to 5-ampere ratio, 60,000 volts are being built by the Commission for this new installation. Panels are being purchased from A. H. Winter-Joyner Company. The remaining electrical equipment is being supplied by the Canadian Westinghouse Company.

Frequency Changer Equipment

The three Johnston & Phillips transformers installed at Cooksville, for stepping up from generated voltage of the frequency changer set at 2,300 volts to the Cooksville bus voltage, were rebuilt by the Packard Electric Company in April, 1919, to have a capacity of 350-kv-a. each as water-cooled units. One 750-kv-a., three-phase Moloney transformer temporarily replaced these transformers during their rebuilding. The transformers were completed by the Packard Electric Company in July, 1919, and re-installed at Cooksville in the frequency changer building in August, 1919.

In order to determine the input of the frequency changer set to the Niagara System, it was decided in March, 1919, to purchase and instal a Westinghouse recording wattmeter, recording reactive volt-ampere meter and a watthour meter on the frequency changer set 4,000-volt starting panel. These meters were installed in July, 1919.

Milton Municipal Station

Metering Equipment

In July it was decided to purchase and instal a Westinghouse recording reactive volt-ampere meter on the incoming 13,200-volt line in this station. Later, owing to the increased load, it was decided to replace the Canadian Westinghouse type "KB" current transformers (20/5-ampere ratio) on the incoming line with similar transformers of a 40/5-ampere ratio. These changes will be completed early in 1920.

Streetsville Distributing Station

Owing to the importance of the load on the Streetsville feeder in the Streetsville Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Woodbridge Distributing Station

Owing to the importance of the loads on the Woodbridge and Bolton feeders in the Woodbridge Distributing Station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on each of these feeders, was authorized in July. The meters will be delivered about December, 1919, so that this installation will be completed early in 1920.

YORK TEMPORARY TRANSFORMER STATION

As Cooksville Transformer Station was becoming overloaded it was decided to build a temporary 110,000/13,200-volt transformer station to feed Etobicoke Station at 13,200 volts. The station was built on the site obtained two years ago for York Station, on Church street, a short distance north of Mimico. The building in constructed to accommodate four 1,250-kv-a. 63,500/13,200-volt power transformers, one 110,000-volt incoming line, and one 13,200-volt outgoing feeder, with the necessary switching equipment, service transformers and switchboard.

The building is approximately 32 by 44 by 24 feet high (inside dimensions), and is of wood frame construction, covered with corrugated galvanized sheet iron, with a board hip roof covered with ready roofing. There is a lean-to extension at one corner 7 by 17 by 10 feet high for the service transformers and water pump.

A room 10 feet 6 inches by 14 feet by 10 feet high is partitioned off in one corner for a control room, and a wooden floor is laid in this room. The main floor is of cinders with the transformers and other heavy apparatus resting on beams embedded in the floor. Four large removable sections are bolted in the walls opposite the four power transformers so these may be easily removed from the station. The building was erected by the Commission's Construction Department and was completed in September, 1919.

Electrical Equipment

The 110,000-volt feeder into this station is obtained by tapping off between two sets of disconnecting switches inserted in the 110,000-volt, Cooksville to Toronto line. These switches are mounted on a special pole structure directly under the high-tension line some twenty feet from the building. From this structure the feeder is carried to disconnecting switches mounted on the outside of the station wall and then in through Ohio Brass Company entrance bushings.

The equipment in this station consists of four 1,250-kv-a., 63,500/13,200-volt General Electric single-phase, 25-cycle, water-cooled transformers (one being a spare) fed through a Canadian Westinghouse "GA" oil circuit-breaker in the station. The low-tension transformer leads are connected to a 13,200-volt delta bus, which is carried on pipework to two Canadian Westinghouse "GA-3" oil circuit-breakers, one of which connects to the outgoing 13,200-volt feeder to Etobicoke Station, and the other to a bank of three 50-kv-a., 13,200/575-volt, single-phase Siemen's transformers, used for station service, and electric heaters.

The oil circuit-breakers are of the automatic hand-operated type, protected by Condit "A," "I.D.T.O." relays using a number of dry cell batteries for the direct current tripping circuit. Weston indicating meters, and a Westinghouse recording wattmeter and reactive volt-ampere meter, mounted on temporary wooden panels, are installed to measure the power.

The cooling-water for the transformers is obtained temporarily from a well near the station by means of a pump and motor obtained from Dundas Transformer Station, the water being carried from the transformers to a cooling tower and then back to the well. A permanent pump house is being built beside a creek some distance from the station, from which water will be supplied by means of two Canadian Blower Forge Company pumps driven by Canadian Westinghouse 20 horse-power, 3-phase, 550-volt induction motors, one pump being a spare unit. A 550-volt, 3-phase feeder is taken off the service transformers mentioned above and carried down to this pump house for these motors.

Two of the 1,250-kv-a. transformers and the 110,000-volt, "GA" oil-switch were transferred from Dundas Transformer Station. The other two 1,250-kv-a. transformers were transferred from London Transformer Station while the three Siemen's Company 50-kv-a. service transformers were transferred from the Commission's Stores at Toronto.

All the electrical equipment was installed by the Commission's Operating Department, the work being completed and the station placed in service October 10, 1919.

Etobicoke Distributing Station

Incoming 13,200-Volt Lines

As it was desired to have the 13,200-volt feeders to this station arranged so that it could be fed from either the Cooksville Transformer Station or the new York Temporary Transformer Station, one of the two 13,200-volt Cooksville

feeders was changed to feed from York Station, the two Cooksville lines being connected in parallel through disconnecting switches on a pole structure near the station and brought into the station on one line. Two 13,200-volt lines from York Transformer Station are brought into the station and connected in parallel through disconnecting switches inside the station, and then through an oil circuit-breaker to the station bus. One type "OF" lightning arrester is connected to the paralleled York feeders, and one electrolytic arrester is connected to the paralleled Cooksville feeder. These changes in the feeders were made by the Commission's Operating Department and were completed and placed in service on October 10, 1919.

Operator's House

It was decided to erect a house on the station site so that the operator would always be available, and subject to call at any time.

A design was, therefore, prepared and the work is well under way. The design calls for a seven-room brick and stucco house with concrete basement, hot-air furnace heating, electrical lighting and modern plumbing, with sewer and water service being connected to the town mains. The 110/220-volt lighting circuit for this house will be taken from a knife switch on the service panel in the distributing station.

This house is being constructed by the Commission's construction staff, and will be ready for occupancy by the end of the year.

Temporary Station

The temporary station building which was left standing for sometime after the equipment was removed was finally torn down in July, 1919, and the building material was used in York Temporary Transformer Station building.

KENT TRANSFORMER STATION

Increased Transformer Capacity

Due to the load conditions on this station, it was decided to instal a second bank of three 1,250-kv-a., 63,500-26,400-volt transformers and switching equipment. As increased capacity was needed before these transformers could be manufactured, it was decided to instal temporarily a bank of three 750-kv-a., 63,500-13,200-volt transformers, and to feed the municipality of Chatham at 13,200 volts until the larger transformers could be installed.

Plans were prepared and material ordered for this temporary installation. Four Canadian Westinghouse Company 750-kv-a., 63,500/13,200-volt, single-phase transformers were transferred from Guelph Transformer Station to form the temporary second bank in this station, the fourth transformer being stored outside the station as a spare unit.

The 110,000-volt bus was extended to feed this second bank through a Westinghouse "GA" oil circuit-breaker, transferred from Dundas Transformer Station. The low-tension side of this bank was connected to a temporary 13,200-volt bus, through a Westinghouse "GA-3," 33,000-volt oil circuit-breaker, and the two Chatham feeders were temporarily connected to this 13,200-volt bus. The high-tension bus extension, the transformer delta bus and the GA-3 oil circuit-breaker were installed in a permanent manner so as to be serviceable for the permanent No. 2 bank.

This temporary bank of transformers and the switching equipment was installed by the Commission's Construction Department and placed in service October 12, 1919.

It is the intention to transfer to this station for the permanent No. 2 bank, three of the 1,250-kv-a., 63,500-26,400-volt Westinghouse transformers now in service at Brant Transformer Station when these are released by the installation of larger units there early in 1920. This station will then have an installed capacity of 7,500-kv-a. When this transfer is made, differential relay protection will be installed on both transformer banks.

Low-Tension Switching Equipment Improvements

The installation of asbestos barriers between the 26,400-volt feeders mentioned in the last Report was completed by the Commission's Operating Department in June, 1919.

On account of the increased transformer capacity to be installed, it was considered advisable to strengthen the 26,400-volt type "E" oil circuit-breakers. Accordingly, a contract was placed with the Canadian Westinghouse Company Limited, for parts for seven breakers. The installation of these parts will be done early in 1920 by the Construction Department.

Totalizing Meters

Plans are prepared for the installation early in 1920 of station totalizing meters consisting of Westinghouse graphic wattmeter and graphic reactive volt-ampere meter, and of two watthour meters, one for each bank of transformers. These meters are now on order.

Sarnia Municipal Station

In November, 1918, at the request of the Sarnia Hydro-Electric Commission, the necessary material was ordered by the Commission to increase the capacity of the station equipment for three 4,000-volt power feeders. The changes in the station were carried out for the local commission by the Construction Department, being completed on March 10, 1919.

In October, 1919, instructions were received from the Sarnia Hydro-Electric Commission to obtain tenders on one 1,500-kv-a., 3-phase, 25-cycle, water-cooled, 26,400/13,200-4,000/2,300-volt transformer, together with the switching equipment required, also to prepare plans and estimates for a low-tension emergency bus.

Brigden Distributing Station

Owing to the increased load on this station, the purchase and installation of a 75-kv-a., three-phase, 25-cycle, 26,400-13,200/4,000-2,300-575-volt, Packard transformer was authorized in May, to replace the original 50-kv-a. Moloney transformer.

This change was completed and the new transformer placed in service in July. The 50-kv-a. transformer was transferred to the Oil Springs Distributing Station.

Oil Springs Distributing Station

Owing to the increased load on this station, it was decided in May, to increase the transformer capacity by transferring the 50-kv-a., three-phase, 25-cycle, 26,400-13,200/4,000-2,300-575-volt Moloney transformer from the Brigden Distributing

Station and connecting it in parallel with the 75-kv-a. Moloney transformer. It was also decided to replace the General Electric recording wattmeter installed in this station with a Westinghouse type "RA" graphic recording watt-hour meter. These changes were completed by the Construction Department and the new equipment was placed in service in August, 1919.

Dresden Distributing Station

Owing to the importance of the load on the Dresden feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

Blenheim Distributing Station

Owing to the importance of the load on the Blenheim feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and its necessary equipment on this feeder, was authorized in July. The meter will be delivered about December, 1919, and this installation will be completed early in 1920.

Ridgetown Distributing Station

Owing to the importance of the load on the Ridgetown feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July.

The meter will be delivered about December, 1919. This installation will be completed early in 1920.

Forest Distributing Station

Owing to the importance of the load on the Forest Feeder in this station, the purchase and installation of a Westinghouse recording reactive volt-ampere meter and necessary equipment for same on this feeder, was authorized in July. The meter will be delivered about December, 1919, so that this installation will be completed early in 1920.

ESSEX TRANSFORMER STATION

As the installation of all the switching equipment for the new feeder, referred to in the last Report, could not be completed in time to supply the Essex County System with 25-cycle power on February 1st, a temporary connection was made outside the station to connect the Essex County feeder line to either of the two lines, to the Canadian Salt Company Distributing Station.

On July 20, 1919, the new feeder equipment was placed in service, and the Essex County System was supplied from this feeder.

Arrangements have been made to install barriers between the 26,400-volt oil circuit-breaker leads, and between the 26,400-volt lightning arrester leads and choke coils on the different feeders. Also additional screens will be placed in the lightning arrester gallery in front of the opening in the floor through which the 26,400-volt leads are brought up.

Canadian Salt Company Distributing Station

The complete installation of equipment for the operation of No. 2 rotary converter in the Canadian Salt Company's distributing station, as outlined in the last Report, was completed and placed in service in March, 1919, to allow changes to be made in the temporary connections to No. 1 rotary converter.

The complete station equipment was installed by the Construction Department of the Commission. Protective screens for the lightning arrester equipment were ordered in June, 1919, and installed in August, 1919. It was considered advisable in May, 1919, to install no-voltage trip relays in connection with the transformer bank high-tension oil circuit-breakers. Type "C.V." Westinghouse under-voltage relays were ordered in May, 1919, and installed in August, 1919, to take care of this feature of operation. All work in this station has been completed.

ESSEX COUNTY SYSTEM

The last Report referred to changes to be made in the stations of the Essex County System to enable it to be operated at 25 cycles instead of 60 cycles. The changes which were described in the last Report have been carried out as noted below, and the system was operated at 25 cycles on February 1, 1919.

Amherstburg Distributing Station

The three 100-kv-a., 25-cycle transformers, referred to in the last Report, were placed in service on December 13, 1918, and the Essex County System, including Amherstburg Distributing Station, was changed over from 60 cycle to 25 cycles on February 1, 1919. The other changes in the station were completed on June 27th.

The three 100-kv-a., 60-cycle transformers which were removed are at present stored in the Amherstburg Distributing Station, pending transfer to one of the Commission's 60-cycle systems.

Kingsville Distributing Station

As referred to in the last Report, three 75-kv-a., 25-cycle single-phase transformers were transferred from Burford Distributing Station, and were installed in Kingsville Distributing Station in place of the 60-cycle transformers on January 27, 1919. This station was changed over from 60 cycles to 25 cycles on February 1, 1919.

All the other changes referred to in the last Report, except the installation of the maximum demand graphic watthour meter, were completed on April 8th, by the Construction Department of the Commission. The wattmeter has been delivered and will be installed in January.

The three 75-kv-a., 60-cycle transformers which were removed from service, are now stored at Kingsville, pending transfer to one of the Commission's 60-cycle systems.

Leamington Distributing Station

The three 75-kv-a., single-phase, 25-cycle transformers referred to in the last Report were placed in service in place of the 60-cycle transformers on March 23, 1919. All the other changes, except the installation of the maximum demand,

graphic watthour meter, were completed on May 24th, by the Commission's Construction Department. The meter has been delivered and will be installed at an early date.

The three 100-kv-a., 60-cycle transformers removed from service were transferred to Hanover Distributing Station in June.

A fence was erected around the steel structure after this structure was moved to its new location, near the old Leamington Power House, as described in the last Report. This part of the work was also carried out by the Construction Department of the Commission.

Essex Distributing Station

The 75-kv-a., 3-phase 25-cycle transformer referred to in the last Report, was installed to replace the 60-cycle transformers on January 19, 1919 and the station was changed over from 60 cycles to 25 cycles on February 1, 1919.

The other changes referred to in the last Report, with the exception of the installation of the maximum demand graphic watthour meter, were completed in May by the Construction Department. The meter has been delivered and will be installed at an early date.

The three 50-kv-a., 60-cycle, single-phase transformers removed from service are now stored at Essex, pending their transfer to one of the Commission's 60-cycle systems.

A fence around the pole structure was erected by the Construction Department of the Commission.

In August, it was decided to install new 26,400-volt choke coils at this station. The choke coils are being made up by the Commission and will be installed by the Commission's Construction Department in December.

HARROW TRANSFORMER STATION

The 75-kv-a., 3-phase, 25-cycle, transformer, referred to in the last Report, was installed and placed in service in place of the 60-cycle transformers on January 24, 1919, and on February 1st this station was changed over from 60 cycles to 25 cycles. The other changes in the station referred to in the last Report, with the exception of the installation of the maximum demand graphic watthour meter, were completed on May 14, 1919 by the Construction Department of the Commission. The meter has now been delivered and will be installed at an early date.

The three 25-kv-a., 60-cycle, single-phase transformers are being stored, pending transfer to one of the Commission's 60-cycle systems.

In August, it was decided to install new 26,400-volt choke coils at this station, and to erect a fence around the structure. The choke coils, which are being made up by the Commission, will be installed at an early date. The fence was completed on September 5th.

Canard River Distributing Station

The 25-cycle, single-phase transformer referred to in the last Report, was installed in place of the 60-cycle transformers on January 31, 1919 and the station was changed over from 60 cycles to 25 cycles on February 1st.

The two 10-kv-a., 60-cycle transformers which were removed are now stored pending transfer to one of the Commission's 60-cycle systems. The maximum demand graphic watthour meter which was referred to in the last Report has been delivered and will be installed in December.

Arrangements have been made to have a fence erected around the pole structure. This work is being carried out by the Construction Department of the Commission.

In August, it was decided to install new 26,400-volt choke coils at this station. The choke coils are being made up by the Commission and will be installed by the Commission's Construction Department.

Cottam Distributing Station

On January 31, 1919, the 25-kv-a. transformer, referred to in the last Report, was installed to replace the 60-cycle transformers, and on February 1st, the station was changed over from 60 cycles to 25 cycles. The other changes in the station, referred to in the last Report, with the exception of the installation of the maximum demand graphic watthour meter, were completed on March 21st, by the Construction Department. The watthour meter has been delivered and will be installed in December, 1919.

The 25-kv-a., 60-cycle transformer removed from service is now stored pending transfer to one of the Commission's 60-cycle systems.

Arrangements have been made to have a fence erected around the pole structure, and this work is being carried out by the Construction Department of the Commission.

EUGENIA SYSTEM

EUGENIA FALLS GENERATING STATION

The complete switching and metering equipment supplied and installed under contract by the Canadian Westinghouse Company for additional capacity to the Eugenia Falls generating station was fully noted in the last Report. The generator also supplied by the Westinghouse Company has been moved from Flesherton to the power house, and has been erected on its foundation ready to be coupled to the turbine. The turbine erection should be sufficiently advanced in December, 1919, to allow the alignment and the bolting together of the units. The new "G4" Edison battery was placed in service in September, 1919, and replaced the Tudor lead cell battery formerly in service. This was of insufficient ampere-hour rating with the additional breaker control and pilot lamp load. The old battery has been dismantled and crated with the intention of making use of it at some other station.

The originally installed electrical equipment has been moved to the new location and has been rearranged with the additional equipment as a double-bus system, by the Construction Department of the Commission, to be identical with the equipment for No. 3 generator, installed by the Westinghouse Company. No. 3 generator switching equipment and No. 2 transformer bank were placed in temporary service in November, 1918, and operated continuously until September, 1919, when the change-over of No. 1 and No. 2 generator equipment was completed. Minor changes are still being taken care of and in January, 1920, the additional power of the new unit will be available for the system.

Eugenia Falls Operators' Houses

It was decided March 7, 1919, to provide an extension to the superintendent's house at Eugenia Falls, to be used as an office and to provide increased living

accommodation. This extension comprises an office, on the ground floor, 11 by 14 feet, accessible from the living room and outside, and a small room 11 by 7 feet behind the office, accessible from the dining room. The upper storey, 10 by 18 feet, is being used as a sleeping porch accessible from two bed rooms. The extension was completed July 1, 1919, and occupied on that date.

The two operators' houses mentioned in the last Report, were completed and occupied in March, 1919.

Durham Cement Company Distributing Station

To provide increased transformer capacity at the Durham Cement Company Distributing Station, it was decided, in August, 1919, to replace the three 250-kv-a. transformers at this station with three 400-kv-a. transformers to be transferred from the Collingwood No. 2 Distributing Station.

These transformers were moved to Durham in September, 1919, and arrangements are completed for their installation in place of the 250-kv-a. transformers which will be used elsewhere.

Shelburne Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Shelburne feeder panel in the Shelburne Distributing Station was decided on in July, 1919, and the necessary drawings are being prepared for this work. This meter will be delivered in November, and the installation completed in January, 1920.

Station drawings were revised May 20, 1919, to include the installation of a 5-kw. air heater, with the necessary 5-kw. service transformer and wiring. This installation was completed in August, 1919.

Chesley Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Chesley feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work. This meter will be delivered in November and will be installed January, 1920.

Orangeville Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Orangeville feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work.

This meter will be delivered in November and will be installed January, 1920.

Mount Forest Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Mount Forest feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work.

This meter will be delivered in November and will be installed January, 1920.

Hanover Distributing Stations Nos. 1 and 2

Distributing Station No. 1

The change of the low-tension voltage from 2,300 to 4,000 volts, as mentioned in the last Report, was made on November 17, 1918, when the Hanover Portland Cement Company's load was discontinued from this station.

In April, the installation of a new 22,000-volt feeder was authorized to supply Hanover Distributing Station No. 2, located close to station No. 1. This feeder is connected to the 22,000-volt bus between the power transformers and the Canadian General Electric Company type "K-24" oil circuit-breaker through Canadian General Electric Company disconnecting switches. The recording metering equipment was changed from the 4,000-volt to the 22,000-volt side and connected to measure the total load on both distributing stations.

These changes were made by the Commission's Construction Department. The alterations were placed in temporary service in June, and finally completed in September.

It was considered advisable to erect a 22,000-volt pole type station close to station No. 1 to supply power at 2,300 volts to the Hanover Portland Cement Company on account of the increased load of this company.

This station is fed by one 22,000-volt line from Distributing Station No. 1 through a "H.E.P.C." standard air-break switch and Delta Star combination choke coils and fuses. The Station equipment consists of one bank of three 100-kv-a., single-phase, 60-cycle, 23,000/2,300-volt Westinghouse transformers, transferred from Leamington Distributing Station of the Essex County System. The outgoing 2,300-volt feeder is connected to the transformers through Canadian General Electric Company, disconnecting switches and is equipped with Garton Daniels lightning arresters.

This station was erected and the equipment was installed by the Commission's Construction Department, and was placed in temporary service in June, and finally completed in August.

SEVERN SYSTEM

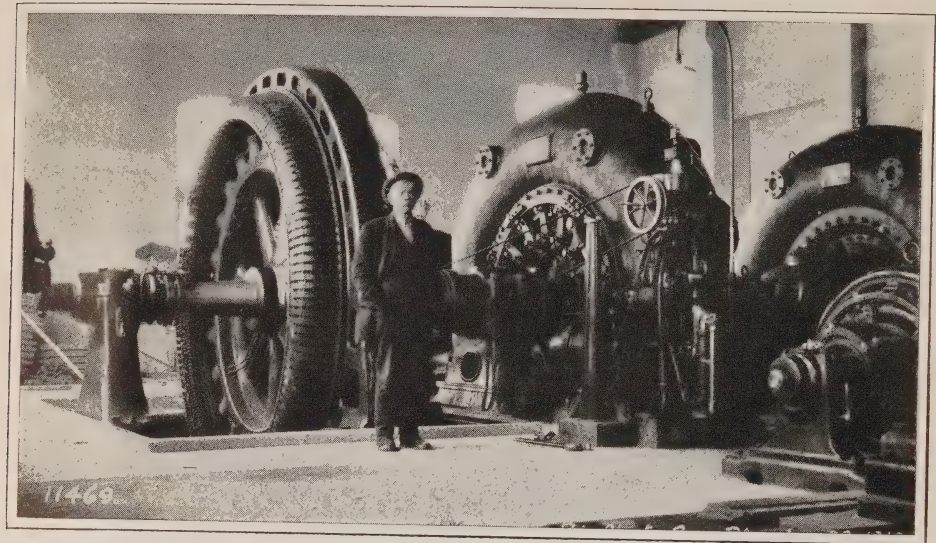
BIG CHUTE GENERATING STATION

The ventilating fans to which reference was made in the last Report, were installed in May, and were used during the summer months. A dressing room and shower bath with hot and cold water have been provided in the station for the use of the operators and other employees.

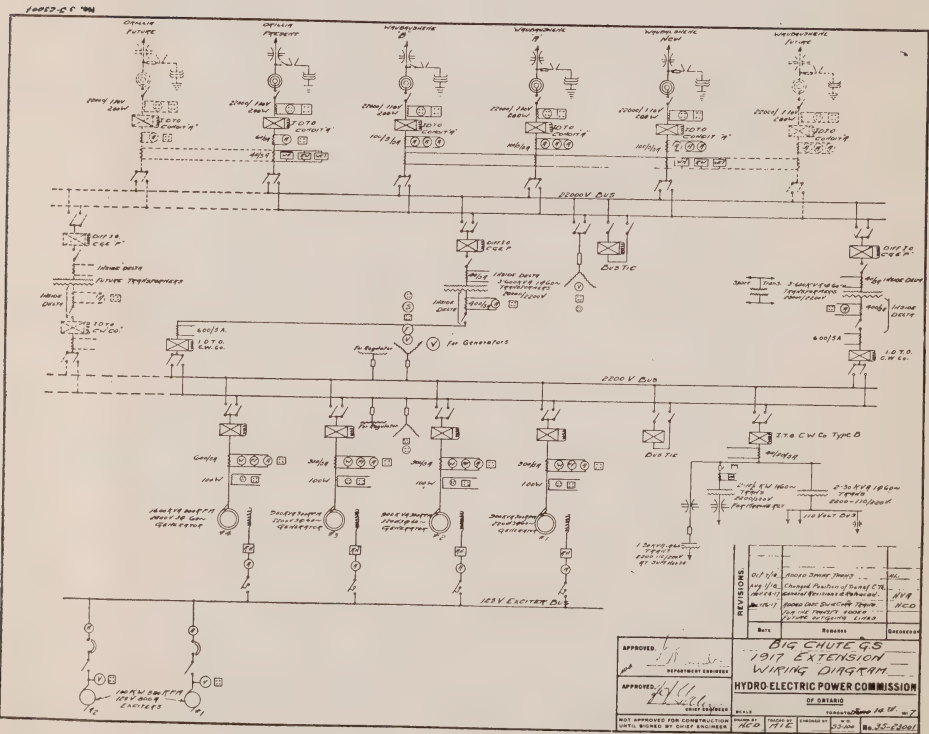
The installation of the 1,600-kv-a. generator was completed by the Canadian General Electric Company, and on January 28th the generator was placed in service.

The work of changing the switching equipment has been going on during the year, and will, it is expected, be completed early in 1920.

On August 1, 1918, the contract was awarded to the Canadian Westinghouse Company for one 600-kv-a., single-phase, 60-cycle, water-cooled, transformer to be installed as a spare in this station. This transformer was tested by one of the Commission's engineers at the Canadian Westinghouse Company's factory on February 26th, and was shipped on April 29th. The transformer was transported from Waubaushene, and installed in the station by the Construction Department of the Commission.



Interior View of Power House showing Unit No. 4, Big Chute Generating Station.



Wiring Diagram—Big Chute Generating Station

On August 5th a 3-horse-power, 1,200 r.p.m., wound rotor induction motor with controller was ordered from the Canadian General Electric Company. This motor will be shipped in December, and will be used to operate the head gates. The new gate house was completed on September 23rd.

The accompanying cuts show the new 1,600-kv-a. generator unit, and the wiring diagram for the station.

Operator's House

The new house referred to in the last Report was completed during the summer, and is now being occupied by the Superintendent. The house is one of the Commission's standard eight-roomed type, and was erected by the Construction Department of the Commission. One room is fitted up as an office for the superintendent.

A combined hot air and electric heating system has been provided.

Collingwood Distributing Stations Nos. 1 and 2

Distributing Station No. 1

All changes in the equipment of this station, as outlined in the last Report, were completed in January, 1919.

Distributing Station No. 2

The installation of equipment in this station, as outlined in the last Report, was completed in January, 1919. This station was in service until May, 1919, when the Wm. Kennedy and Company's plant ceased taking power.

In August, the three 400-kv-a., single-phase, 60-cycle, 22,000/2,300-575-volt Canadian General Electric transformers were removed and shipped to Durham Cement Company distributing station.

Stayner Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Stayner feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work.

This meter will be delivered in November and will be installed January, 1920.

Alliston Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Alliston feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work.

This meter will be delivered in November and will be installed January, 1920.

Elmvale Distributing Station

The purchase and installation of a Westinghouse graphic recording, reactive volt-ampere meter on the Elmvale feeder panel in the above station, was decided on in July, 1919, and drawings are being prepared to cover the necessary changes for this work. This meter will be delivered in November and will be installed January, 1920.

Thornton Distributing Station

Owing to severe lightning disturbances in this district, it was decided in October, 1919, to instal a 22,000-volt lightning arrester at the Thornton distributing station.

A 22,000-volt, three-phase, Delta-Star, outdoor-type lightning arrester will be purchased and installation made early in 1920.

Barrie Distributing Station

It was decided in August, 1919, to replace the original General Electric graphic meters in the above station with a Westinghouse graphic wattmeter and recording reactive volt-ampere meter, and drawings are being prepared to cover the necessary changes in wiring.

These meters will be delivered in November, 1919, and installation will be made early in 1920.

MUSKOKA SYSTEM

SOUTH FALLS GENERATING STATION

In May, a graphic reactive volt-ampere meter was installed on the Gravenhurst feeder, to replace the graphic power factor meter, which was shipped to Toronto.

THUNDER BAY SYSTEM

NIPIGON TEMPORARY GENERATING STATION

To provide light and power for the construction of the main works, a temporary generating station has been erected. The electrical equipment in this station consists of one 250-kv-a., 600-r.p.m., 2,300-volt, 60-cycle, 3-phase generator, with one 12-kw., 1,800-r.p.m., 125-volt exciter and the necessary switching equipment. The generator is belt-driven from a pulley on the turbine shaft, while the exciter is driven from a pulley on the generator shaft. Power is fed out at 2,300 volts to service transformers located at various points, for the construction work, camps, shops, etc.

The generator and exciter were manufactured by the Canadian General Electric Company in 1912, and were purchased by the Commission from MacGovern and Company, Montreal, in March, 1919.

The generating equipment was installed by the Construction Department of the Commission, and was placed in service in September, 1919.

NIPIGON GENERATING STATION

General

The designs for this station are well under way and provide for an ultimate installation of six 10,600-kv-a., 12,000-volt, 3-phase, 60-cycle, 120-r.p.m., vertical water-wheel-driven generators, with direct-connected exciters; three 24,000-kv-a. transformer banks, each consisting of three 8,000-kv-a. step-up, single-phase transformers, connected delta low-tension 12,000-volts and star high-tension for 110,000 volts; three 110,000-volt outgoing lines, a number of 12,000-volt feeders, and the necessary service equipment for the station.

The initial installation will consist of two generating units, one bank transformer, and equipment for one 110,000-volt outgoing line.

Generators

In March, specifications covering two 10,600-kv-a. generators were sent out to the manufacturers. On June 20th, the contract for these two generators, including potential regulators, direct-connected exciters and one motor-driven exciter was awarded to the Canadian Westinghouse Company. The contract provides for the first unit to be erected for operation by May 15, 1920, and the second by July 1, 1920.

These generators, which are of the vertical type, will be provided with two guide-bearings and a water-cooled Kingsbury thrust-bearing, mounted on the upper bearing bracket designed to carry the weight of rotating parts of the generator and turbine rotors and the water thrust in the turbine. They are guaranteed to operate at full rated load of 10,600-kv-a., 80 per cent power factor (current lagging) 12,000-volts, 3-phase, 60 cycles, with a temperature not exceeding 110°C. in any part, with cooling air at 40°C. The insulation is guaranteed not to deteriorate at 150°C. They are also guaranteed to withstand short-circuits and are being designed and built for an overspeed of 222 r.p.m. The direct-connected exciter is mounted above the thrust-bearing and is rated at 125-kw. at 250-volts and is to be capable of exciting the generator under all load conditions. An insulation test of 30,000-volts for one minute after erection is specified for the generator armature, and 55,000 cubic feet of free air per minute will be required for cooling each generator.

Transformers

Specifications for four 8,000-kv-a., step-up transformers were prepared and sent out in August and tenders obtained. The contract for these transformers was awarded to the Canadian General Electric Company on October 15, 1919, and calls for installation to be completed ready for operation in May, 1920.

Each transformer is rated at 8,000-kv-a., single-phase, water-cooled, with full load 80 per cent. power factor, voltage rating of 12,000-63,500 volts with four 5 per cent. over-voltage taps on the high tension windings. The tanks, which are of boilerplate steel, will be completely filled with oil, and an external expansion tank will be connected by piping to each main tank. The high-tension winding will be subjected to an insulation test of 280,000 volts, the low-tension winding to a test of 30,000 volts, for one minute, and in addition a double voltage run for five minutes, will be made. The transformers are guaranteed to operate at rated load with a temperature not exceeding 90°C. with ingoing water at 25°C.

Switching and Protective Equipment

The 12,000-volt oil circuit-breakers will be Canadian Westinghouse Company's type "C" and will be obtained from the Commission's Niagara Transformer Station, where a number of these breakers have been held in stock.

The 110,000-volt, oil circuit-breakers will be Canadian Westinghouse Company's type "GA" which are being removed from the Commission's Dundas Transformer Station and are being rebuilt.

Tenders have been requested on the 110,000-volt lightning arrester and it is expected that the order will be placed in December.

Mechanical Equipment

Designs for the air, water and oil systems for the stations are being worked out. Specifications for one 75-ton and one 10-ton electrically-operated cranes were prepared and tenders obtained. On October 15, 1919, a contract was awarded to Manning, Maxwell and Moore, Inc., for one Shaw 75-ton (with 15-ton auxiliary) electrically-operated, with 550-volt, 3-phase, 60-cycle motors, overhead travelling crane for the generator room. On October 17, 1919, a contract was awarded to Northern Crane Works, of Walkerville, Ontario, for one 10-ton overhead travelling crane, electrically-operated with 550-volt, 3-phase, 60-cycle motors for the gate house. These cranes will be delivered in time for the assembly of the generating units and will be erected by the Commission.

Building

Designs for the building are nearly completed. The building will be of concrete with structural steel framework. It will be erected by the Commission's Construction Department. Only the part required for the control room, offices, two generating units and one bank of transformers and the necessary switching and service equipment will be built at first. The contract for the structural steel was awarded to McGregor and McIntyre, Ltd., Toronto, on September 27, 1919, and shipment will start in November.

PORT ARTHUR-NIPIGON TRANSFORMER STATION

This proposed station will be fed from the Nipigon Generating Station at 110,000 volts. Power will be supplied at 22,000 volts for transmission to the present Port Arthur Distributing Station and system.

The initial installation will consist of one 110,000-volt line equipment, four 4,000-kv-a., single-phase, water-cooled transformers, and four 22,000-volt feeder equipments.

Tenders were requested on the four 4,000-kv-a. transformers in August, and on October 15th the contract was awarded to the Canadian General Electric Company. The transformers are to be delivered in May, 1920. These transformers will be similar in design to those ordered for the Nipigon Generating Station except for the kilovolt-ampere rating and low-tension voltages.

Tenders are being obtained on the 110,000-volt lightning arrester and it is expected that the order will be placed in December.

Drawings of the building are being prepared and the erection of the building will be proceeded with early in 1920.

CENTRAL ONTARIO SYSTEM

HEALEY FALLS GENERATING STATION

The 3,750-kv-a. generator purchased from the Swedish General Electric Company was installed and placed in operation on September 24, 1919. This machine is known as No. 4 generator. Complete tests were made by the Commission's engineers before the generator was placed in service.

Instructions have been received to purchase and instal equipment for No. 4 outgoing 44,000-volt line, which will deliver power to the tie line now under construction between Healey Falls and Peterboro. This equipment is expected to be ready for service early in 1920.

RANNEY'S FALLS DEVELOPMENT

On account of the cessation of hostilities also partly due to volume of other work, the electrical and building designs for the Ranney's Falls development have not been proceeded with. Some further investigation of the proposed development has been carried out, however, during the past year.

It is expected that this development will be started early in 1920.

AUBURN TRANSFORMER AND SWITCHING STATIONS

When it was decided to run a 44,000-volt tie from Healey Falls connecting station to the Auburn Transformer Station at Peterboro, some changes had to be made in the switching tower at the Auburn Station. Outdoor equipment was chosen and arrangements are being made to instal a Canadian Westinghouse 44,000-volt, type "G.A.-3," electrically operated, oil circuit breaker, and a set of air-insulated current transformers which will be built by the Commission.

At the present time, a similar installation at the Auburn Station end of the 44,000-volt tie line, from Port Hope switching station, is being considered.

Equipment has been purchased to make the present Canadian General Electric 44,000-volt, type "K-10," oil circuit-breaker in the transformer station electrically operated. Air insulated current transformers are to be installed here also. These "K-10" and the "G.A.-3" oil circuit-breakers will be controlled from the switchboard in the Auburn Generating Station.

Provision is being made to illuminate the switching tower.

Oshawa Distributing Station

Due to the increasing demand for power it became a necessity to increase the station capacity. It was decided to purchase a 1,500-kv-a., 3-phase transformer. The contract was awarded to the Canadian General Electric Company for one 1,500-kv-a., 3-phase, 44,000/4,160-volt transformer similar in characteristics and voltage taps to those installed at Smith's Falls, Brockville and Merrickville. Delivery is promised in December, 1919. A new switchboard panel to match existing panels and the necessary low-tension switching equipment has been ordered from the Canadian Westinghouse Company to take care of this additional transformer.

The capacity of one outgoing 4,160-volt feeder is being increased to carry additional load.

It is expected that this new equipment will be ready for service in January, 1920.

Sulphide Distributing Station

The new remote had control switchboard consisting of six panels, referred to in the last Report, was erected by the Operating Department of the Commission, and placed in operation in January, 1919.

Wellington Distributing Station

The outdoor distributing station at Wellington, described in the last Report, was put into service on March 25, 1919, delivering power to Wellington and Bloomfield.

Picton Distributing Station

The outdoor distributing station at Picton, described in the last Report, was placed in service on March 6, 1919.

Lindsay Operator's House

For the accommodation of the distributing station operator, a two-story, six-roomed, frame house has been designed, and construction work started on October 23, 1919, by the Commission. The dwelling will have a concrete cellar, a hot-air furnace, electric lighting, modern plumbing and a pneumatic water system, the well being in the basement.

The necessary site was provided by purchasing a strip of land twenty-five feet wide, adjacent to the station site.

Bowmanville Operator's House

For the accommodation of the distributing station operator, a six-room, two-story, frame house was designed and is now under construction by the Commission, work having been started on September 25th. The house has a concrete cellar and is equipped with hot-air furnace heating, electric lighting, modern plumbing and town water.

It is located on the station property.

Cobourg Operator's House

A dwelling for the distributing station operator has been designed and constructed by the Commission, and is located on the station site. It is a two-story frame house of six rooms and has a concrete cellar, hot-air furnace, electric lighting, modern plumbing and town water supply. Work was started August 20th and finished October 23, 1919.

Madoc Operator's House

A five-room frame cottage, designed and constructed by the Commission, has been erected on the station property for the accommodation of the distributing station operator. The cottage has a concrete cellar, hot-air furnace, electric lighting and pneumatic water system. Construction work was started on June 24th, and the cottage completed on August 25th.

ST. LAWRENCE SYSTEM

CORNWALL TRANSFORMER STATION

This station, as described in the last Report, was completed by the Commission's Construction Department and the equipment was cut into service on May 1, 1919.

A water supply has been secured by building an intake at the canal and connecting this to the pumps installed in the station basement. Provision has been made in the piping for a future cooling pond. The finishing of the site with roads, paths and boundary fences is under way and practically completed.

Operators' Houses

As the station is about three miles west of the Town of Cornwall, it was necessary to provide dwellings for the operating staff. Accordingly two standard design, frame houses were authorized and are now practically completed. Both are two story houses, the larger one having eight rooms, and the smaller having

six, each having a concrete cellar, hot-air furnace heating, electric light, modern plumbing and a septic tank.

A central water system in the larger house comprises a motor-driven pump and pressure tank, the water being drawn from a nearby well. The system is designed to take care of present and future domestic requirements.

The houses were erected by the Commission's Construction Department.

Toronto Paper Company Distributing Station, Cornwall

About the first of the year a site was acquired for a sub-station near the Toronto Paper Company's factory.

In March, the Construction Department commenced work on the foundations of a buff brick building, 32 by 26 by 42 feet high. A full sized concrete basement was provided, and the layout was arranged for a future extension to the building, when the necessity shall arise. The floors and roof are of reinforced concrete and are carried on structural steel beams and columns.

One 750-kv-a., 3-phase, 60-cycle, water-cooled, 44,000/4,160/600-volt transformer was purchased for this station from the Canadian General Electric Company. This firm also furnished the high-tension current transformers. One incoming 26,400-volt line from Cornwall Transformer Station supplies this station, and a Westinghouse "GA-3" oil circuit-breaker is installed for this line. The Canadian Westinghouse Company furnished the high-tension disconnecting switches.

At present, a temporary switchboard controls the outgoing 600-volt feeder to the Toronto Paper Company and one 26,400-volt incoming line. The permanent 6-panel board has been ordered from the Canadian General Electric Company and will be installed ready for service in January, 1920.

Provision has been made for the future extension to the station, as mentioned in the last Report.

The station was first placed in operation on June 15, 1919.

Brockville Distributing Station

About the first of April, the remodelling of the high-tension equipment was completed, and the second 750-kv-a., Canadian General Electric transformer placed in service. This makes the total transformer capacity 1,500-kv-a.

The installation of the new remote hand control switchboard has been completed. The bus-tie and the two transformer panels are the property of the Commission, while the two 2,200-volt feeder panels belong to the municipality. The old switchboard panel was incorporated in this switchboard and controls one of the transformers.

Instructions have recently been received to replace the graphic power factor meter by a graphic, reactive volt-ampere meter. The meter has been ordered and the installation will proceed at an early date.

Most of the equipment except the transformers is of Canadian Westinghouse manufacture.

Chesterville Distributing Station

The outdoor distributing station referred to in the last Report has been constructed at Chesterville.

The equipment comprises one 300-kv-a., 3-phase, 44,000/25,400-4,160/2,400-volt Canadian General Electric transformer with Delta-Star air-break switches, choke coils and arresters.

One 4,000-volt outgoing feeder supplies power to the municipality. The panel controlling this feeder was brought from Winchester distributing station, where it was formerly used to control the 4,000-volt feeder to Chesterville.

This station was cut into service on August 3, 1919.

Winchester Distributing Station

The panel which controlled the feeder supplying the Municipality of Chesterville has been removed, during the past year, from Winchester station and placed in the new distributing station at Chesterville.

Prescott Distributing Station

Instructions have been received to replace the present Canadian General Electric graphic wattmeter by a Canadian Westinghouse graphic wattmeter, and also to instal a Westinghouse graphic, reactive volt-ampere meter. The new meters have been ordered and the installation of them will be undertaken by the Commission's Operating Department when they are delivered.

IROQUOIS TRANSFORMER STATION

The step-up transformer station at Iroquois was taken out of service when power was available from Cornwall Transformer Station.

The station equipment is to be removed and most of it will be used at Carleton Place distributing station.

RIDEAU SYSTEM

HIGH FALLS GENERATING STATION

Since the last Report plans have been prepared and work started on the building, which will be of reinforced concrete, the approximate dimensions being 94 feet long, 62 feet wide and 35 feet high, above the foundation walls. The generator room will house the turbines and generators. The control room, located at one end of the building, will contain the switchboards and low tension oil circuit-breakers, a glass partition affording a view of the generator room floor. A gallery above will carry the high-tension oil circuit-breakers, arresters and wiring. Sufficient basement will be provided to carry conduit and house the service transformers and generator field rheostats.

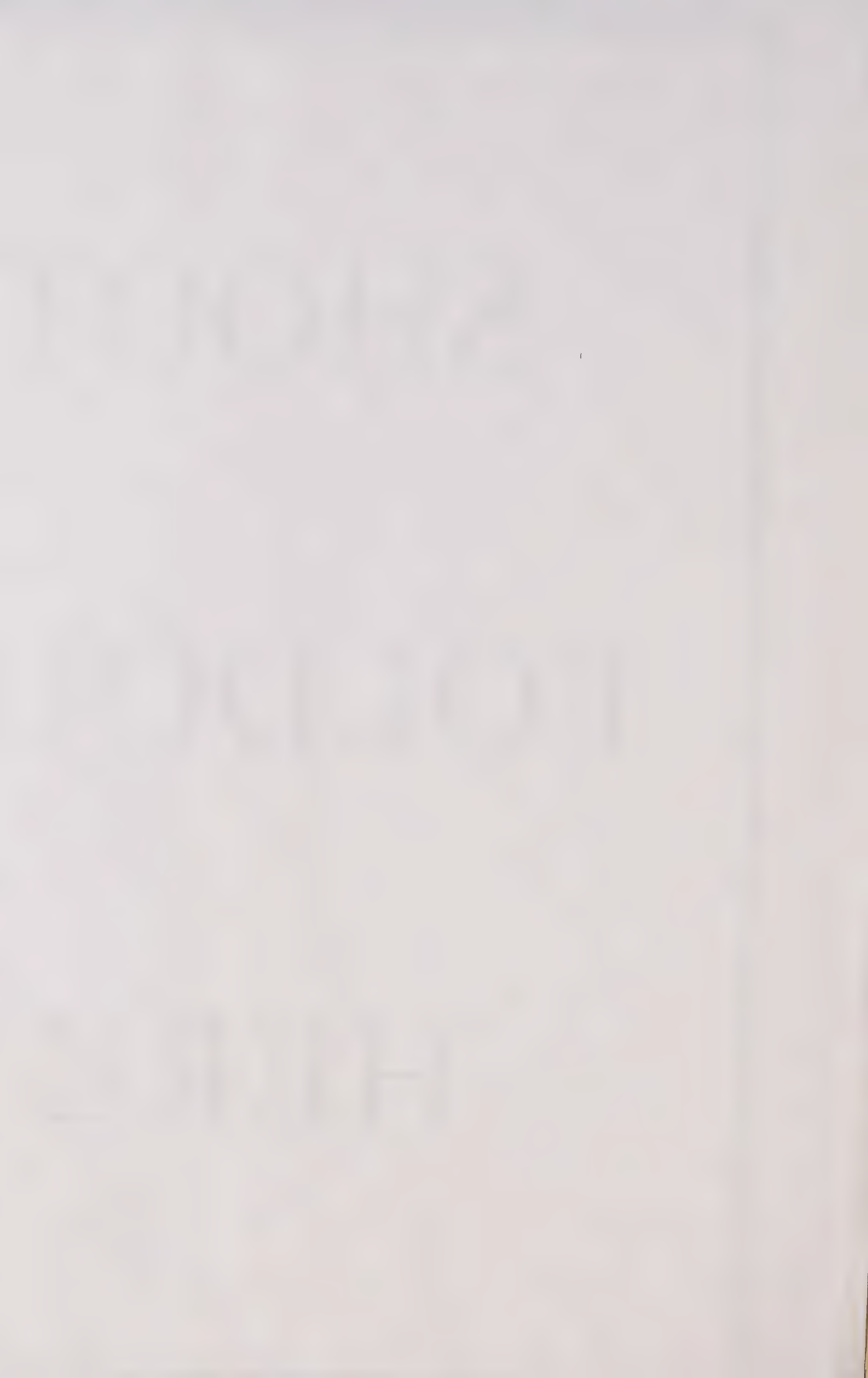
Five 3-phase, 60-cycle, 300-r.p.m., horizontal shaft generators, four of 350-kv-a., and one of 875-kv-a. capacity, along with their switch-gear are of General Electric make and were purchased from the Hannawa Falls Power Company. The 350-kv-a. generators are direct-connected in pairs (one on either end) to two turbines. The 875-kv-a. unit is direct-connected to its turbine.

Three 25-k.w. exciters, belt-driven from the turbine shafts, and an automatic voltage regulator were purchased from the Canadian General Electric Company.

Three 750-kv-a., 3-phase, 60-cycle, 4,160/2,400/44,000/25,400-volt, water-cooled, step-up transformers were purchased from the Packard Electric Company, St. Catharines, Ontario.

A thirteen-panel switchboard controls the whole station, the oil circuit-breakers being remote hand-operated. Five generator panels were purchased with the generating equipment and eight new panels are being supplied by the Canadian Westinghouse Company.

The station will deliver power at 26,400 volts when put in operation, but provision is made for changing to 44,000 volts.



A fifteen-ton, hand-operated travelling crane of 58-foot span has been purchased from the Northern Crane Works, Walkerville, Ontario.

Provision has been made for electric heating and lighting throughout.

It is expected the plant will be ready for operation in the spring of 1920.

A temporary sub-station was constructed last spring to supply power and light from the 25,400-volt line for construction purposes. Three 75-kv-a., Packard Electric Company transformers were installed in this station.

Operator's House

For the present accommodation of the construction superintendent, and later for station operators, an Aladdin cottage of the Holmwood design was purchased, and was erected by the Commission's Construction Department. It is a seven-room frame structure with concrete cellar, electric lighting and heating, and modern plumbing. Water supply and sewage disposal are to be arranged for in conjunction with construction of additional housing accommodation for the operating staff.

Smith's Falls Distributing Station

The new permanent switchboard comprising eight panels, which are arranged for remote hand control, was purchased from the Canadian General Electric Company. Installation work was started September 10th and completed October 31st. Two transformer panels only are the property of the Commission, the remaining six panels being the property of the municipality of Smith's Falls. These comprise three feeder panels, two generator panels and one totalizing panel, all of which match up with the panels belonging to the Commission.

The low-tension equipment is operated at 2,400 volts.

Perth Distributing Station

Soon after the building was completed, the three 200-kv-a. 26,400/2,300-volt, single-phase Canadian General Electric Company transformers, originally at Brockville, were installed in this station and work started on the installation of the equipment.

The switchboard purchased from the Canadian Westinghouse Company was not delivered until the end of January and this delay held up work for some time. The board which is arranged for remote hand control comprises five panels, only one of which is the property of the Commission, the other four panels, two feeders, one totalizing and one generator panel being the property of the municipality.

The station was put into service on February 27th. Power is supplied to it over the 25,400-volt line from Merrickville. Power will later be supplied to Perth distributing station from High Falls generating station, when the latter station is ready for service. Provision is made for future operation at 44,000 volts.

CARLETON PLACE GENERATING STATION

The generating station formerly owned and operated by H. Brown and Sons, was purchased by the Commission on May 1, 1919, under which body it is now operating.

A brick and concrete building contains the generating equipment which comprises three Samson Leffell vertical turbines, each rated at 287 horse-power at 600-r.p.m.; two Woodward governors and two Canadian General Electric Company horizontal type alternators, one rated at 150-kv-a. and one at 250-kv-a., 2,300-volts, 3-phase, 60-cycles, 600-r.p.m. A two panel switchboard, also made by the Canadian General Electric Company, controls the alternators.

Carleton Place Distributing Station

The store room of generating station building is to be remodelled somewhat to make room for three 250-kv-a., 26,400/2,200-volt, single-phase Pittsburg transformers, to be transferred from Iroquois Transformer Station, and necessary 46,000-volt switching and protective equipment. Some switching equipment will be taken from the dismantled Iroquois Transformer Station for this station.

Drawings for the high-tension layout are about completed and it is expected work will be finished early in 1920, thus linking up another generating station with the Rideau System.

Municipal Switchboard

The Municipality of Carleton Place has purchased the necessary feeder and lighting panels to control its load. The panels will be erected by the Commission's Construction Department in the generating station.

OFFICE BUILDINGS

In order to furnish additional office space of a temporary nature, 57 Murray street, Toronto, was modified by removing several partitions, shifting the toilet room to a new location, providing additional windows, etc. In this way, two large rooms were obtained in the rear portion of the house, one on the ground floor and one on the second floor. Certain modifications were made to some of the front rooms. The electric wiring was rearranged and new fixtures provided where necessary. Additional heating plant, consisting of water boiler and a considerable amount of cast iron radiation was installed. The second floor was bridged over to the second floor of 59 Murray street, thus permitting communication between the upper floors of the houses.

To provide further accommodation, the residence at 46 Murray street has been leased.

The matter of increased office accommodation for the rapidly growing organization at 190 University avenue has been under construction for some time. During the summer, certain studies were made with a view to the proper selection of the best type of building to house an engineering organization whose work is widely diversified. It is proposed that the next building to be constructed should be for the accommodation of the various engineering departments, and therefore, might be called the "Engineering Building" to distinguish it from the existing "Administration Building." Two important factors entering into this work are (a) the designing of a building suitably laid out with a view to future extensions, and (b) to make in connection with the new building the initial installation of a central heating plant. Thus the present investigations embrace the future complete layout.

The building proposed is six stories in height, of fire-proof construction, the walls to be faced with buff pressed brick similar to the side and rear walls of the present building fronting on University avenue.

Borings were made at a number of points on the Commission's property adjacent to the existing building. These borings were recorded and plotted. A suitable thick bed of blue clay was selected and by means of a testing structure a load was super-imposed on this stratum of clay, to determine its safe bearing value. This test was witnessed by a city inspector, and a ruling was made by the City Architect permitting a loading of three tons per square foot to be imposed by the footing of the new building.

SECTION V

POWER CONSTRUCTION

POWER AND STORAGE SURVEYS

General

As usual the Commission has been energetic in searching for all available information in connection with storage reservoirs and possible power developments. The main investigations are being carried out on the St. Lawrence and Trent Rivers but miscellaneous investigations, of a more or less important nature, have been carried out during the year in various parts of the Province. Various municipalities have been given advice upon request and the Commission's engineers have spent considerable time reporting on these various enterprises.

Trent River Storage Investigation

An intensive study has been made of the hydrology of the entire watershed. This has been made possible partly through information obtained from the Department of Railways and Canals, which maintains metering sections and measuring weirs on the various portions of the stream. The various power houses on the river were also a very valuable source of information and the data obtained therefrom has been carefully checked with run-off data from other watersheds topographically and geologically similar.

Much reconnaissance work has been done in the upper watershed and the various storage dams at present installed have been inspected and their condition noted. The sites of these dams and dam sites for alternative storage schemes have been surveyed and in some cases tentative layouts have been drawn up.

Data have been obtained in connection with various operations, such as lumbering, which are likely to affect the river flow, and log chutes have been measured up.

The present manner of operating canal reaches, etc., has been thoroughly investigated and is now being analyzed. Various storage schemes have been surveyed and proportional costs for increased power received worked out.

Severn River Watershed

The various small upper lakes have been investigated with regard to storage possibilities. An intensive study was projected with regard to the most efficient means of operating Lake Simcoe and Couchiching and the proper time of the year to fill these lakes up. In considering this the interests of navigation were considered in conjunction with the various power interests on the river.

St. Lawrence River Survey

In accordance with the procedure outlined in last year's Report, the investigations for power development on the St. Lawrence River have been prosecuted energetically. Several parties have been continuously engaged in locating contours on both sides of the river from the head of the Galops Rapids to the foot



Extension to the Ontario Power Company



Extension to the Ontario Power Company

of the Long Sault. Artificial features are being tied in and related to the various contours. Metering parties have been engaged in obtaining information on the river flow, an operation entailing a great deal of hard work, as the river is split into many small channels which affect the flow. Studies relative to various schemes of power development have been made and the calculation of back water effect from the proposed works is under way. Extensive drilling operations are in progress at Cat Island and Morrisburg, in order that accurate information may be obtained with regard to the rock strata.

NIAGARA SYSTEM

POWER CONSTRUCTION

Ontario Power Company Extension

During the past year the power house of the Ontario Power Company has been enlarged as outlined in last year's Report to accommodate two new machines of 20,000 horse-power rated capacity. This installation involved the excavation of 147,000 cubic yards of material and the placing of a wood stave pipe 13.5 feet in diameter and 6,600 feet long.

Excavation for No. 3 pipe was completed by the beginning of February, 1919, and the installation of the 13.5-foot wood stave pipe was finished by the end of that month. The pipe was filled March 17th, and No. 13 and No. 14 turbines were placed in operation on this conduit on March 19, 1919. The concrete envelope, with which parts of the pipe are surrounded, was started in February and finished at the beginning of July. Back-filling started in February and is now completed except for grading and trimming in park.

The addition to the power house was built to withstand water pressure due to a head of 40 to 50 feet as such fluctuations have been known to exist in tail water level at the power house.

The water wheels are double runner central discharge turbines running at a speed of 187.5 r.p.m. and developing 20,000 horse-power under a head of 180 feet. The gates are operated by vertical servo-motors which are in turn controlled by actuators on the gallery floor. One of these wheels was placed in operation on June 19th and the other on August 12th.

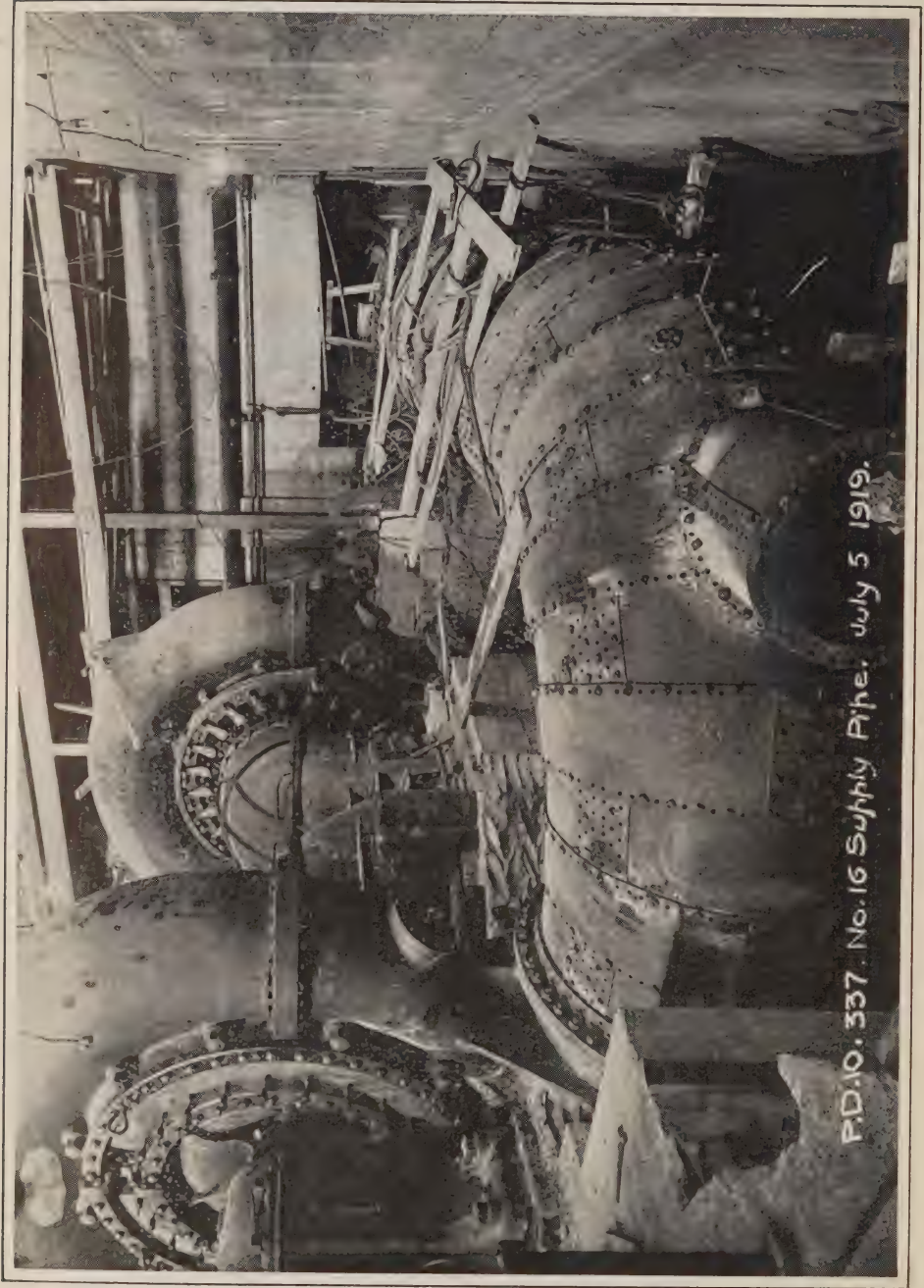
In connection with the new pipe line a Johnston differential surge tank was installed. This is so designed that it is capable of full load rejection without overflow. It was placed in operation on May 22nd.

All the construction work was handled by the Construction Department of the Commission.

Queenston-Chippawa Development

During the year construction on the new development from Chippawa to Queenston as outlined in last year's Report has gone ahead rapidly. Intensive studies are being made with regard to entry conditions and extensive experiments have been conducted with various types and designs of intakes. This constitutes a complex problem inasmuch as it must be so designed that it will operate successfully with bad ice conditions on the upper river. It is also necessary that a lock gate be provided at this point.

The river section is rapidly being deepened and widened by means of dredges and cableway. To date there have been 244,000 cubic yards of material removed from the intake and 492,000 from the river section.



Extension to the Ontario Power Company



Queenston-Chippawa Development





Excavation on the canal proper is progressing favorably. To date, 3,675,000 cubic yards of earth and 283,000 yards of rock have been removed. Concrete has been placed on walls and canal linings to the extent of 1,500 cubic yards and rip-rap amounting to 117,000 cubic yards has been placed.

The forebay is now assuming more definite shape, 437,000 cubic yards of rock having been removed. The drilling of forebay rock is progressing favorably.

Some idea of the magnitude of this work may be gathered from the fact that the largest electric shovels ever built have been handling this work and that 50 miles of standard gauge railroads have been built in connection with construction operations.

In addition to this there is being built a power house railway, which will connect with the Michigan Central at Queenston. The side of the gorge at the power house site has been cleaned, and the power house excavation proper will shortly be started. A large crusher-conveyor system has been installed which provides stone for concreting and ballasting.

The two 50,000 horse-power turbines which are being built by the Wellman-Seaver-Morgan Company are in a sufficiently advanced stage of construction to insure delivery next spring.

ELECTRIC RAILWAY WORK

Queenston-Chippawa Development

During the past year a large number of power line crossings along the canal route were either elevated or diverted, including the 60,000-volt transmission lines of the Toronto and Niagara Power Company, numerous Bell Telephone Company lines, Great North Western and Ontario Power Company's transmission lines. It was necessary to provide a 90-foot clearance, to permit equipment working along the canal section to be free to move, and this extreme height necessitated structures of a costly nature to ensure continuity of service on the lines elevated.

The G.T.R. (Wabash) double-track arch, involving the placing of over 3,000 cubic yards of concrete and sixty-five tons of steel, was completed and traffic restored from the temporary diversion made on a timber trestle. The three-track trestle for the diversion of the G.T.R. main line and M.C.R. branch line was placed in service and the excavation of the roadbed completed in preparation for the arch structure to be erected. The excavation for foundations was proceeded with and the M.C.R. portion of the arch carried up to the springing line. Work is now in progress on the G.T.R. portion of the arch. The completion of the arch ring proper will be deferred until the spring of 1920.

The completion of the Niagara, St. Catharines & Toronto and Wabash arches and G.T.R.-M.C.R. temporary bridge has greatly facilitated the work in the movement of equipment, and in the material to be disposed of from the canal section, in that work trains are now free to move under these respective railways without being subject to former delays caused by inability to cross them.

Several temporary highway bridges have been erected, including the Thorold and Portage road Bridges. Permanent structures will be completed during the season of 1920, when the movement of equipment along the canal section has ceased.

Permission was granted by the Department of Railways and Canals to temporarily close the Welland River to traffic for the season of 1919, and a temporary pile trestle was constructed for the diversion of highway traffic pending completion of the permanent structure. The original structure has been removed, plans com-

pleted and contracts awarded for the erection of steel superstructure including two 75-foot steel spans and one 100-foot bascule life-span. Excavation is now being proceeded with for the foundations of this bridge, which will form the connecting link on the Boulevard of the Niagara Falls Parks Commission. A 24-foot roadway has been provided with one 6-foot sidewalk and the design provides for the addition of another 6-foot sidewalk when traffic conditions will warrant it. The Niagara Falls Parks Commission has contributed toward the additional cost of the roadway in order to bring it up to their requirements as to width.

A temporary pile trestle approach for the diversion of the M.C.R. tracks was driven for that railway in the Welland River, Chippawa Village, and the swing span moved to one side a distance of 38 feet. The work is now proceeding in the construction of foundations for piers and abutments to restore this span





Successive stages in the construction of the Main Line, Double-Track
Chippawa



100-foot Arch for the Wabash Railway over the Hydro Power Canal, Queenston Development

to the original alignment. A portion of the cost of placing the M.C.R. through girders in lieu of the pile trestle originally in place will be borne by the M.C.R.

Plans are being prepared for the diversion of the M.C.R. main line at Montrose, and for the permanent steel structure to carry the tracks of that railway over the completed canal.

Owing to the desirability of connecting the power house with the M.C.R. branch line to Niagara-on-the-Lake at Queenston, it was deemed necessary to construct a spur-line through Queenston along the foot of the escarpment to the Power House site. Permission was secured from the Niagara Falls Parks Commission, Ordnance Branch of the Department of the Interior, Canada Steamship Lines, the Village of Queenston, M.C.R. and International Railway for the location along the Niagara River. In order to dispose of the large amount of material necessary



to be excavated on the Power House site, and owing to the peculiar topographical features of Queenston, a proposal was made to the International Railway to extend its line along Queen street to the Ravine, in which it was proposed to locate the Construction Railway. After considerable negotiations this agreement was effected, and the Commission will construct the roadbed on which the International Railway and the Commission will have joint running rights, giving the latter access to the water front and to the Power House, in return for which the International Railway has agreed to permit the disposal of all material on the Power House site on lands owned by it at Queenston.

Niagara Construction Railway

During the year the Commission decided to purchase two more electrically operated shovels which necessitated additional locomotives and sub-station equipment. This work was handled almost entirely by the Mechanical Section of the

Railway Department. A contract was made with the C.E.A. Carr Company for the supply of four 500-k-w. rotary convertors complete with transformers and switching equipment. This apparatus is now being installed in the Montrose sub-station, and so will permit the two 500-k-w. units, purchased for that station, to be added to the other four similar units at the Whirlpool Station to carry the extra load that will result when the new locomotives are placed in service. The Mechanical Department were required to send engineers to investigate a number of equipments that were offered for sale and all were carefully inspected before closing the contract with the Carr Company. These same engineers also inspected railway motor equipments and were finally able to make arrangements with a large interurban line in the United States to sell the Commission some motors of the same type as were already giving good service, on six of the original locomotives. The department drew up specifications for new locomotive bodies and trucks—tenders were invited from the manufacturers and finally a contract was made with the Canadian Car and Foundry Company for the supply of eight locomotives. These have all been delivered and are in operation, six being equipped with General Electric No. 66-B motors, purchased as above outlined, and two with Westinghouse No. 562 D-5 motors, similar to those in use on six of the original locomotives.

The Mechanical Department also located a complete locomotive equipped with similar Westinghouse motors and was able to secure it at a very low price. Thus the plant is now supplied with a total of twenty-one electric locomotives all of which are equipped with G.E. 66-B or Westinghouse 562 D-5 motors which fact results in considerable saving in maintenance costs.

EUGENIA SYSTEM

Eugenia Falls

The extension to the plant at Eugenia Falls is now practically complete. This has meant a large addition to the power house to accommodate the new machine and switching equipment.

A cross-over and distributor have been installed to carry water from the penstock to the new wheel. The turbine was manufactured by the Allis-Chalmers Company of Milwaukee, and will develop 4,000 horse-power when running at 720 r.p.m. under 550 feet head. It is direct connected to one 2,810-kv-a. generator. This unit will be placed in operation late this year. In order to increase the plant capacity, piers and stop logs were placed on the spillway of the main dam, thereby increasing the storage. This work was all carried out by the Construction Department of the Commission.

SEVERN SYSTEM

Big Chute

The addition to the Big Chute, rendered necessary by the ever-growing demand on the Severn System, was completed during the past year.

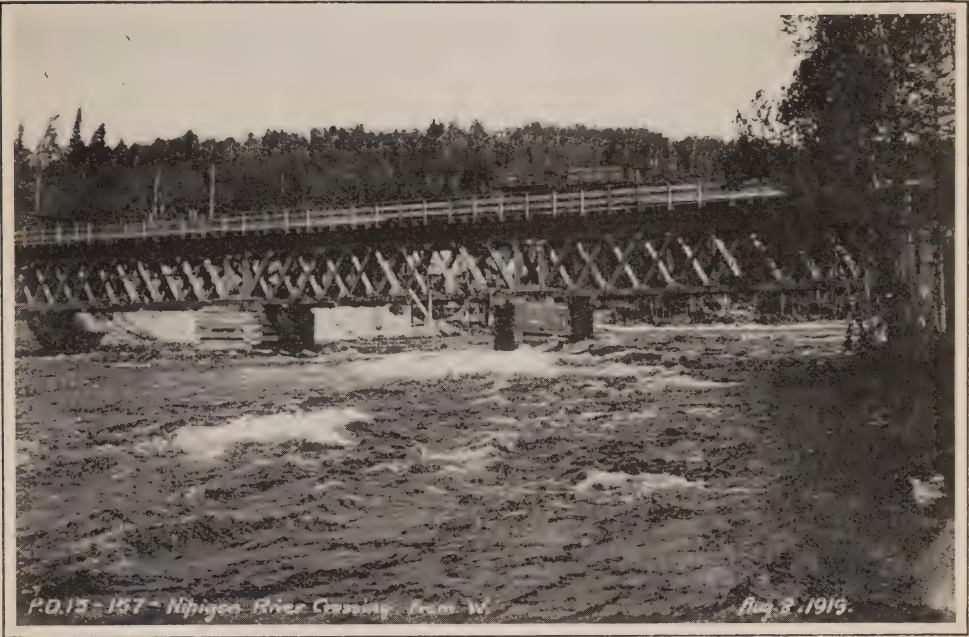
The addition consists of a new set of racks and a new gate house, in conjunction with which the forebay walls were raised some two feet in height. From the gate house a new 9-foot diameter steel penstock conducts water to the turbine. This penstock is connected by a cross over, in which is a butter-fly valve, to the old pipe.



View of Dam at High Falls, Mississippi River—High Falls Development



Nipigon Development



Nipigon Development



Gatehouse entry, chamber, High Falls Development

The new turbine, constructed by the Wellman-Seaver-Morgan Company, of Cleveland, is of 2,300 horse-power capacity at 56-feet head and 300 revolutions per minute, is of the double discharge horizontal runner type, and is direct-connected to one 1,600-kv-a. generator. This unit was put in operation on February 5, 1919. The power house was enlarged to accommodate the new turbine and generator.

The surge tank was raised some ten feet in height and a diaphragm inserted in order that the tank might approach the differential principle in operation.

THUNDER BAY SYSTEM

Nipigon Development

This development is being installed on the Nipigon River at Cameron's Falls, about 15 miles above Nipigon Village on the Canadian Pacific Railway. The drainage area of the river at this point is 9,100 square miles of which Lake Nipigon is 1,530 square miles.

Owing to the inaccessibility of the power site, it was found necessary to build a standard-gauge railroad approximately one mile in length from Cameron's Falls Station on the C.N.R. This work was started late in 1918 and was finished early in 1919. A timber-truss bridge was built across Nipigon River immediately below Cameron Pool, so that material in car lots can be placed on the site of work.

A temporary power plant to supply power for construction purposes has been built. The development utilizes about 20 feet of fall and is capable of generating about 1,400 horse-power at the turbine line shaft, and consists of two vertical turbines driving the line shaft through crown gears. Three air compressors and one alternating current generator are belt driven from this shaft. Each compressor has a capacity of 1,050 cubic feet of free air per minute compressed to 125 pounds per square inch pressure. The generator is of 250-kv-a. capacity at 2,300 volts and 60 cycles. The construction of this plant was found necessary owing to the high price of coal delivered to the works and the difficulty of obtaining it.

A dam consisting of a gravity section with about five sluices will ultimately be installed, but at present water is being taken directly from the river into the intake. After passing through the intake it enters the forebay, thence passing a distance of 365 feet to the racks. The headworks are of reinforced concrete, from which supply pipes, also of reinforced concrete, will carry water to the turbines.

The turbines are 12,500 horse-power, single-runner, vertical units, operating under 72 feet head at 120 r.p.m. They are being manufactured by the I. P. Morris Company, of Philadelphia. They are set in reinforced concrete scroll cases direct-connected to 60-cycle Canadian Westinghouse generators. The draft tube is also of reinforced concrete and discharges into a tail race about 1,000 feet in length.

The earth and rock excavation for forebay, power house and tailrace of the permanent development are being handled by two Marion shovels, models No. 50 and No. 60, two stiff leg derricks, one Browning locomotive crane and five standard gauge dinky locomotives with forty 6-yard dump cars. Rock drilling is done with Ingersoll-Rand drills. A rock crushing and elevating plant, and gravel screening and washing plant, is being installed in conjunction with the concrete mixing plant.

A crib cofferdam has been built at junction of tailrace and river to unwater tailrace cut.

The present installation is to consist of two units but will ultimately be six. Power will be transmitted on wood pole lines a distance of 60 miles to Port Arthur and Fort William.

Camps for accommodation of construction force have been built on the east side of river opposite development site. Bunk houses are steam heated from a central plant and recreation rooms and showers are provided for the men. Owing to the inaccessibility of job the Commission operates a general store for the convenience of the construction forces.

CENTRAL ONTARIO SYSTEM

Healey Falls

It was found necessary to enlarge the plant at Healey Falls, and during the past year this work was completed.

The addition consists of a new steel penstock 12 feet in diameter, which supplies water to one Wellman-Seaver-Morgan turbine, which develops 5,600 horse-power at 72 feet head and 240 r.p.m. This wheel is of the double runner centre discharge, horizontal type in cylindrical steel plate casing and is direct connected to one 3,750-kv-a. generator. This unit was placed in operation September 4, 1919.

The installation of this new unit required additional tail race excavation to the extent of some 48,000 cubic yards.

Ranney's Falls

It is intended in the near future to start the development at Ranney's Falls on the Trent River in the vicinity of Campbellford. Some preliminary estimates have been made and tentative layouts drawn up.

RIDEAU SYSTEM

High Falls Development

This development is on the Mississippi River just above Dalhousie Lake. Here the river has a drainage area of 450 square miles and with the storage lakes above is capable of maintaining a mean flow of about 280 cubic feet per second.

Construction was started towards the end of 1918 and good progress has been made. The concrete dam has been finished and the canal, gate house and pipe line excavation completed. The gate house substructure forms are nearly finished and most of the concrete poured. The power house site has been unwatered, the excavation nearly completed and most of the substructure forms built.

The dam is a concrete gravity section. Water is taken directly from the intake into a canal running a short distance to the headworks. A wood stave pipe 10 feet in diameter is being installed to carry water to the turbines.

The turbines were purchased from the Hannawa Falls Power Company, and are of the horizontal setting, cylindrical casing double-discharge type operating under 85 feet head at a speed of 300 r.p.m. These are of 1,200 horse-power capacity, one being direct-connected to one 875-kv-a. generator, and one to two 350-kv-a. generators. The excitation is to be provided by three 25 kw. exciter units which are belt driven.

SECTION VI MUNICIPAL WORK

NIAGARA SYSTEM

GENERAL

During the year engineering assistance in connection with extensions to the systems and operation difficulties was given to the following municipalities: Bolton, Dereham Township, Dresden, Forest, Galt, Georgetown, Hamilton, Hespeler, Highgate, Ingersoll, Linden, London, London Township, Milton, Mimico, New Toronto, North Norwich Township, Petrolia, Point Edward, Port Credit, Port Dalhousie, Port Stanley, Ridgetown, Rockwood, Sandwich, Sarnia, St. Catharines, St. Thomas, South Norwich Township, Strathroy, Tavistock, Thamesford, Thorndale, Tilbury, Toronto Township, Vaughan Township, Wallaceburg, Waterdown, Waterford, Watford, Welland, Weston, Woodbridge, Wyoming.

Work of a preliminary nature was done in arranging for rural power and lighting service in the following townships:

Albion, Eramosa, Esquesing, King, Markham, Nassagaweya.

Ailsa Craig

Engineering assistance was given during the year in connection with extension of power feeder to supply several additional power customers. Assistance was also given in connection with general operation of the system during the year.

Ancaster Township

Hydro enabling and money by-laws were voted on and passed by the whole township, the township taking over the lines which had already been constructed and making arrangements for extensions to the system.

Engineering assistance was supplied to the township in connection with the operation of the system, and plans were prepared for extensions to the system.

Baden

Larger equipment was purchased to supply the flour mill with additional power. Assistance was secured for the maintenance of the distribution system in general.

Barton Township

Arrangements were made through the Commission for the purchase by the township from the Hamilton Hydro-Electric System, of such lines as have been constructed in the township by the city system.

Arrangements were also completed whereby the township system would be operated by the Hamilton Hydro-Electric System, and the Commission arranged for the Hamilton Commission to keep separate records for the township and to submit period records in connection with such operations to the township council.

Blenheim

Assistance was given to the municipality in connection with the operation of the system, and a number of estimates were prepared in connection with supplying

power to the coal docks at Rondeau station and to the C.W. & L.E. Railway at Cedar Springs, both of which loads, if obtained, would be supplied from Blenheim Station.

Bothwell

A number of extensions were made a short distance outside the municipality to supply power to oil pumping outfits. Most of the Bothwell oil field is now pumped by Hydro power.

Brantford

Engineering assistance was given to the municipality in connection with the proposed extensions to the distribution system to provide additional capacity to take care of the rapidly increasing domestic loads.

Brantford Township

Engineering assistance was supplied in connection completion of street lighting and distribution systems in the township, complete plans being prepared for extensions to the rural section.

Burford Township

An investigation was made in connection with supplying the rural districts adjacent to the Village of Burford, and a short extension was made from the village system to supply several customers in the township.

Chatham

Negotiations were completed for the purchase of the Chatham Gas Company's electrical distribution system in the City of Chatham. According to the arrangements made, the system was purchased by the Chatham Hydro-Electric System by the payment of a certain amount each year for a period of twenty years. The arrangements also provided for the Chatham Hydro-Electric System to take over the entire business and system of the Chatham Gas Company, with the exception of such meters and transformers as were out of date or of too small capacity to be used to advantage by the local Hydro System.

Waterworks Pumping

A general examination with preliminary report was made on the pumping station and source of supply covering the consideration of a new station with possible location higher up the River Thames, with recommendation for careful surveys and observations on the quality of the water as influenced by reversal of flow in the reach from which water is obtained for the supply of the city.

Chinguacousy Township

A considerable amount of preliminary work was done in preparing plans for power and domestic lighting service in Huttonville, as well as for service to other parts of the township.

Chippawa

A complete street lighting and distribution system was constructed by the Commission for the village, the plans being prepared by the engineers of the Commission. Assistance was also given in connection with arrangements for the operation of the system.

Clinton

Assistance was given in connection with the purchase of additional equipment to supply power to new customers. Changes and additions to the street lighting system were also under consideration, and orders have been placed for new ornamental standards.

Comber

Arrangements were made to supply power to a large flour mill in the village; also for increasing the capacity of the incoming power lines to take care of this increased load.

Dorchester

An extension was made during the year to supply power to a local chopping and flour mill. Engineering assistance was given in connection with this extension and also in connection with operation of the system.

Downey Township

In order to prepare an estimate on the cost of supplying the number of farmers who have petitioned for Hydro power, a full investigation and survey of Downey Township has been made. With this information on hand it is expected that a rate will be submitted for the consideration of the township at an early date.

Dundas

The Dundas Public Utilities Commission was given assistance in connection with methods of operation, and arrangements were also made with the system for the supply of power to the Township of Ancaster and a power customer at Cope-town, both of which loads are supplied from the Dundas sub-station, a 2,200-volt line having been constructed from the Dundas sub-station to Copetown to supply a chopping mill at that point.

East Nissouri Township

Considerable interest has been taken by the farmers in this township for a supply of Hydro power, and a complete survey and canvass has been made of the north half of the township with a view of securing accurate data for the preparation of an estimate.

Elmira

The Commission's engineers assisted the local system in connection with the supply of additional power to one of their customers as well as giving advice on local extensions and improvements.

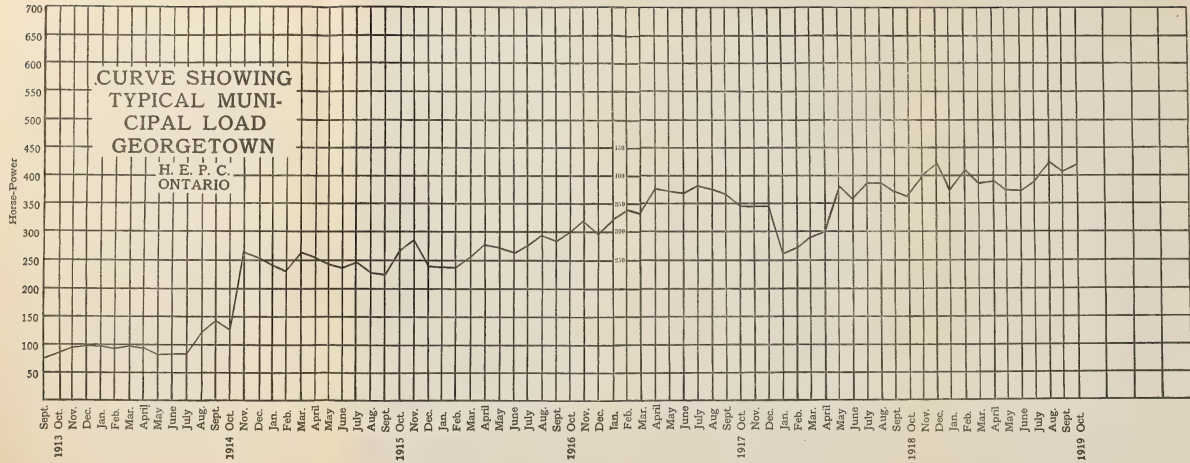
Etobicoke Township

Negotiations were completed by the Commission in connection with the purchase from the Toronto Suburban Railway Company, of the company's distribution system in the Hamlet of Thistletown, and engineering assistance was given in connection with the reconstruction of this system.

Investigations were made in connection with the many proposed extensions for light service in the township, and engineering assistance was given in connection with the building of a number of extensions and in the operation of the system.

CURVE SHOWING
TYPICAL MUNI-
CIPAL LOAD
GEORGETOWN

H. E. P. C.
ONTARIO



Exeter

Waterworks Pumping

A report was made recommending the addition of an electric pumping unit to the present power pump which is operated by a water turbine, when there is sufficient water for power, or by a gasoline engine, the proposed unit to have a capacity of 225-g.p.m. with automatic features to minimize the attendance necessary.

Goderich

New equipment was purchased to supply power to a large flour mill and other customers.

Waterworks Pumping

The 6-inch centrifugal pump of 700-g.p.m. capacity mentioned in last year's Report has been installed, and on test met all requirements successfully.

Guelph

Assistance was given to the municipality by engineers of the Commission in connection with arrangements for increasing sub-station capacity to take care of additional customers.

Assistance was also given the municipality in connection with plans for the operation of the municipal pumping plant by electric drive.

Waterworks Pumping

Considerable changes have been made in the layout for this station, as given in the previous report, due to objections by the Fire Underwriters to a station containing equipment other than that required for water supply, and a complete new layout has been prepared and contract let for two domestic units and one booster for fire service, with provision for a third domestic unit and another booster.

The domestic units comprise one 6-inch 4-stage pump of 750-g.p.m. capacity at 220 feet head, direct connected to a 75 horse-power Crocker-Wheeler motor using 550-volt, 3-phase, 25-cycle current, and one 8-inch 2-stage pump of 1,350-g.p.m. capacity at 220 feet head, direct connected to a 125 horse-power motor. These units are being supplied by Messrs. Goldie and McCulloch. The booster unit consists of one 10-inch double suction pump of 2,100-g.p.m. capacity at 115 feet head, direct connected to a 100 horse-power Crocker-Wheeler motor. All the units operate at about 1,460-r.p.m.

The domestic units are located over the present suction well, and discharge into a 16-inch main, with the booster on a by-pass. A 20-inch Venturi meter, with Simplex type of recording instrument is being provided on this main.

The estimated cost of the installation is \$18,500.

Hagersville

Engineering assistance was given to the village in connection with the supply of power to the stone quarries located close to the village, the stone from these quarries being used mostly in connection with new road scheme in the Hagersville district.

Kitchener

Considerable work was done investigating the conditions of the local street railway together with the G. P. & H. and the Waterloo & Wellington Railway, in order to secure data to enable the Commission's engineer to submit an equitable rate for the power supplied to the Kitchener Street Railway and the companies mentioned above.

General assistance in reference to the revision of the distribution system and station equipment was given throughout the year. It is expected that new 13,200-volt sub-stations will be erected to supply power to the new rubber plants and other manufacturers desiring to locate in Kitchener.

Listowel

Considerable extension has been made in the distribution system, in particular the installation of additional capacity for power customers. The quantity of power asked for has necessitated the Commission increasing the capacity of the sub-station.

Markham

Plans were completed for the construction of a transmission line to the municipality, and arrangements were made for the immediate construction of this line, power service being very urgently required owing to the condition of the local steam plant.

Niagara Falls

Engineering assistance was given to the Niagara Falls Hydro-Electric System in connection with the operation of the system, and an investigation and report made in connection with arrangements for additional sub-station capacity.

Assistance was also given in connection with a proposed store and office building for use by the local system.

Waterworks Pumping

The 24-inch emergency feeder pipe described in the last report has been completed, and a new unit is about to be installed in the pumping station, replacing an hydraulically operated triplex pump.

The unit consists of a 10-inch two-stage pump of 1,740-g.p.m. capacity at 270 feet head, direct coupled to a 200 horse-power, Westinghouse motor for 2,200-volt current, the contract having been let to Messrs. Goldie and McCulloch.

This pumping station is supplied with current through an underground cable from the Ontario Power Company. At a point about 1,000 feet from the Ontario Power Company, there is a double-throw oil-switch connecting to two cables, carried from that point to the pumping station. A new cable is to be laid from the Ontario Power Company to where the present cable joins the two cables to the pumping station so that there will be two independent cables fed from separate transformer banks. Each cable will be of sufficient capacity to serve all the electric pumps in the water works station. Each cable in the water works station will be connected to the bus through an automatic oil-switch and disconnecting switches. Disconnecting switches will be placed in each of the motor circuits.

The estimated cost of the installation is \$7,040.

Niagara-on-the-Lake

A Hydro enabling by-law was voted on and passed at the municipal elections, and a contract entered into with the Commission.

Engineering assistance was given in connection with arrangements for the operation of the system, and the standard Hydro bookkeeping system was installed.

The 12,000-volt transmission line between St. David's and Niagara-on-the-Lake, owned by the municipality, was purchased by the Commission, and the power rate to the municipality was based on supplying power at the municipality instead of at St. David's as formerly.

Waterworks Pumping

Owing to obsolescence of the steam reserve in the present station and the cost of fuel, it was recommended that a gasoline-driven fire pump be installed in the place of the steam pump, and a contract has been awarded to the Storey Pump and Equipment Company for a unit consisting of one 8-inch, 3-stage, Morris pump rated at 800-g.p.m. at 285 feet head, direct coupled to a 6 x 6, six-cylinder Van Blerck engine operating at 1,250 to 1,300-r.p.m. The engine is fitted with electric starter, the storage battery being charged by a 7.1-ampere, 35-volt, General Electric D.C. generator, belted to the coupling of one of the present domestic electric units. This arrangement obviates the necessity of running the gasoline engine to charge the battery, or of having duplicate batteries and keeping one on charge at an outside garage. The estimated cost of the unit installed with necessary piping and gasoline service equipment is \$6,728.

Oil Springs

The municipality was given engineering assistance in connection with supplying additional power for the operation of some oil pumping plants.

The capacity of the pole-type station was increased from 75 to 125-kv-a.

Palmerston

Assistance was rendered Palmerston during the year in regard to the sale of the town's 60-cycle generator, which was replaced when Hydro was installed. General assistance has been rendered in regard to a supply of power to various small power customers.

Paris

Engineering assistance was given to the municipality during the year in connection with proposed new street lighting system in the business section, it being proposed to remove the poles and wires from in front of the business blocks and supply the stores from the rear.

Assistance was also given the local Commission in connection with extensions to the system and matters pertaining to the operation of the system.

Parkhill

During the year a contract was signed with the Commission for the delivery of 75 horse-power at 4,000 volts. At the request of the municipality, plans for a distribution system were prepared and the necessary material ordered for the construction of same. Construction of the distribution system and line is now under way.

Port Colborne

Hydro enabling and money by-laws were submitted and carried, and arrangements were made to purchase the distribution system in the village, which is now the property of the Ontario Power Company.

At the request of the municipality, a number of extensions were made to the existing system to take care of new sub-divisions.

Port Dover

Estimates of the cost of power to Port Dover were prepared and submitted for the approval of the municipality, and the usual Hydro by-laws are to be submitted at the coming municipal elections. An estimate was also made of the cost of constructing a complete street lighting and distribution system in the municipality.

Rodney

In the early part of the year engineering assistance was given to Rodney in connection with extensions to the lines to take care of the local flour and chopping mill. Assistance was also given from time to time in connection with the general operation of the local system.

Sarnia

Engineering assistance was supplied to the municipality in connection with proposed extensions to system to take care of additional loads.

Arrangements were also made through the Commission whereby the Sarnia System is to take care of a large power customer located in Point Edward, just outside the Sarnia city limits, the Point Edward system not being equipped to take of this large power customer.

St. Mary's

Assistance has been given to St. Mary's in reference to the changes in the waterworks system, and the proposed changes in the local station and distribution system to take care of new power loads expected.

Scarboro Township

A considerable number of extensions were made to the Scarboro township system, and engineering assistance was given by the Commission in connection with the construction of these and also in connection with the operation of the system in Scarboro Township.

Seaforth

General assistance regarding the purchase to additional equipment required to take care of new customers has been rendered. A request has been received from the Village of Brucefield asking for an extension from Seaforth.

Stamford Township

A complete survey was made of the township with a view to supplying rural customers who wish Hydro power.

Engineering assistance was given to the Stamford Hydro-Electric System in connection with the operation of the local system, and also in connection with proposed extension of system to take care of additional customers.

Stratford

Considerable interest was taken in the opening exercises in connection with the new sub-station and remodelled waterworks plant in Stratford. By means of air-compressors driven by induction motors Stratford is securing pure well water for all purposes, and has sold the filtering equipment which was necessary when part of the supply came from the river. An additional gasoline engine driven pump has been installed to increase the capacity of the auxiliary pumping equipment. The success of the two units originally installed being responsible for the purchase of the third.

Tillsonburg

Owing to the increased power demands on the Tillsonburg system, arrangements were made to increase the sub-station capacity; three 250-kv-a. transformers were ordered to replace the three 150-kv-a. transformers originally installed.

During the year general assistance was given to the local system in matters pertaining to the operation of the same.

Waterloo

Due to the ever increasing load the local commission has requested assistance to remodel and enlarge the present sub-station, intending to install a bank of three 750-kv-a., three-phase, water-cooled transformers, with provision for the fourth transformer of the same size for future requirements.

Waterloo Township

A thorough investigation and canvass of Waterloo Township was made during the year in order to secure accurate data to prepare an estimate for the supply of Hydro power to the farmers in the township and suburban customers between Preston and Kitchener. This data is being compiled, and it is expected that an estimate giving the cost of service will be submitted to the township during the coming year.

Windsor

An inventory and valuation was made of the power and lighting system of the Sandwich, Windsor & Amherstburg Railway Company, which company's entire railway system is being purchased by the Commission on behalf of the Border Municipalities. The power and lighting system of the S. W. & A. Railway is to be purchased by the Windsor Hydro-Electric System from the Commission and a by-law in connection with this question is being submitted to the electors at the coming municipal elections.

When this system is taken over by the Windsor Hydro-Electric System, it is proposed to operate the steam plant as at present, until additional Hydro power is available.

Waterworks Pumping

The two 4,200-I.g.p.m. units referred to in the previous report are now at Windsor awaiting erection.

A new layout of the intake connections has been made, also, of all discharge mains in the vicinity of the pumping station, but labor conditions in the foundries has greatly handicapped the delivery of material where pipe and specials of considerable dimensions are required; only such material as is required for the new suction well and connections being yet on the site.

The general works within the station are being carried out by Messrs. Wells and Gray, and good progress is being made on the suction well and concrete work connected therewith.

All the electric starting equipment will be located on a gallery with the exception of the small panels mounting the handles for the oil switches. These panels will be located on the pump-house floor, the switches being operated by rods and bell cranks. The main starting oil-switches are 3-pole, double-throw, non-automatic on the starting side, but automatic on the running side. The starting side is connected through the starting compensator to a 3-pole, single-throw, non-automatic, oil-switch operated by tandem mechanism connected to the operating handle of the non-automatic side of the main 3-pole, double-throw, oil-switch. On each switchboard panel is mounted an ammeter and a polyphase watt-hour meter and on one panel is mounted a polyphase graphic recording watt-meter which records the total load on the station.

Woodstock

In order to better take care of power customers in the eastern section of the city a new transformer station was installed in that district and connected to the main sub-station by a 13,200-volt feeder.

A new office building was purchased on the main street of the city and fitted up to take care of offices and salesroom for the Woodstock system.

Wyoming

The municipality was assisted in connection with the operation of the local system, and arrangements made to supply power to a flax mill located in the municipality.

Yarmouth Township

A partial survey was made of the township in the district adjacent to the City of St. Thomas with a view to supplying suburban and rural consumers. Plans and estimates in connection with supplying this district are now under way.

York Township

Enabling and money by-laws were voted on and passed on April 5, 1919, for the purchase and extension of the distribution system in the township, which had already been constructed by the Toronto Hydro-Electric System.

Negotiations were commenced by the Commission to provide for the operation of the township system by the Toronto Hydro-Electric System, and arrangements were made for numerous extensions to the system, to take care of the suburban and rural customers, engineering assistance being given in connection with the construction of these extensions.

An inventory was taken of the distribution system in the township belonging to the Toronto Electric Light Company, with the object of purchasing this system.

EUGENIA SYSTEM

GENERAL

An excellent showing was made by the various utilities comprising the Eugenia System during the year 1919, nearly every municipality having increased its demand over and above the average for the year 1918. Whereas no new transmission lines or sub-stations were constructed, and only one new town was added to the system, the line and station to serve which was completed during the previous year, yet on the other hand numerous extensions were necessary to existing distribution systems to serve new power customers and to provide for the increased demand established by existing industries.

An analysis of the operating statements of the various municipalities mentioned above was prepared for the purpose of investigating the application of the lighting and power rates, as well as the rates charged for street lighting service and the operation of the waterworks pumping plants.

As a result of this analysis, the Commission was able to authorize adjustment of local rates in various municipalities, as well as a refund to the corporations of all amounts collected in excess of the cost for energy supplied for street lighting and waterworks service in accordance with legislation governing same.

Assistance and engineering advice was given to the following municipalities concerning the construction of extensions for serving new customers, and the operation and management of the local utility, and engineers of the department made periodical trips to the various municipalities for this purpose. Assistance was also given to the local officials in soliciting new power customers and supplying information to same in the nature of the cost of power, cost of installation of electrical equipment, the most economical methods of using electric energy, and other matters of similar nature:

Arthur, Chesley, Chatsworth, Durham, Dundalk, Elmwood, Flesherton, Grand Valley, Holstein, Hanover, Mount Forest, Markdale, Neustadt, Orangeville, Owen Sound, Shelburne, Tara.

Engineering assistance and advice was given to the local officials in connection with the passing of money by-laws to provide capital for the purpose of financing extensions to the local distribution systems in the following municipalities:

Arthur, Flesherton, Orangeville, Shelburne, Tara.

Engineers' affidavits were prepared and submitted to the Ontario Municipal and Railway Board, in connection with these by-laws, as required by the legislation governing same.

Bruce County District

Estimates were prepared and submitted, investigations and surveys made to determine the probable lighting and power demands, and general engineering advice and assistance given in connection with securing Hydro-Electric service in the municipalities listed below.

Information was also given concerning the submitting of money and enabling by-laws to the ratepayers in the various municipalities, and a general meeting was held at Wingham in the month of September, at which the various municipalities interested were represented by delegates, for the purpose of considering the estimates of the Commission, and to devise ways and means to secure Hydro power.

The district in which the various towns and villages are located comprises the greater part of Bruce County, and includes the northern portion of Huron County, and has been designated the Bruce County District.

The investigation carried on by the Commission involved a careful study of the source of power from which service to these municipalities could be given, the possibilities being the Niagara System, the Eugenia System, and a separate development on the Saugeen River near Port Elgin. It was finally decided to give service from the Eugenia System, with provision made for connection to the Niagara System, and the construction of the Saugeen Development at a future date when same is required.

The municipalities comprising the district are as follows:

Belgrave, Bluevale, Blyth, Brussels, Formosa, Fordwich, Gorrie, Kincardine, Lucknow, Mildmay, Port Elgin, Ripley, Southampton, Teeswater, Walkerton, Wroxeter, Wingham.

Artemesia Township

Estimates and reports were prepared and submitted, and engineering advice given, in connection with serving various customers in this township, including the Hamlet of Proton Station. It is expected that arrangements will be completed for constructing a sub-station and distributing lines in the southern portion of the township early in the coming year, to provide service to those customers desiring same.

Arthur

A special investigation was made, estimates prepared and reports submitted concerning changing of the transmission line feeding the municipality of Arthur from the Grand Valley Station from 4,000 to 22,000 volts, and the construction of a sub-station in the Municipality of Arthur. Arrangements will probably be made to undertake this work early in the coming year. These changes were found necessary to provide for the increased demand for power in this municipality, which has increased by approximately 50 per cent. during the year 1919 over the previous year.

Chatsworth

A money by-law was submitted to the ratepayers in this municipality on January 6, 1919, for \$1,200, for the purpose of providing the local officials with the necessary capital to finance extensions to the distribution system. The by-law was carried almost unanimously. Assistance was rendered to the local officials by the engineers of the Commission in connection with placing this by-law before the electors.

Chesley

Special assistance was given to the local officials in connection with making extensions to their distribution system to provide service for the demands of existing customers.

The load in this municipality for the year 1919 shows an increase considerably in excess of 100 per cent. over and above the average for the year 1918.

Durham

Extensions were made to the plant of the Durham Cement Company, in the nature of the installation of a large number of 60-cycle motors, and engineering advice and assistance was given the company by the Commission in connection with this work. The demand for power by this company was greatly increased during the year 1919 over and above the average demand of 1918.

Hanover

Estimates and reports were prepared and submitted, and engineering advice given, in connection with providing increased capacity in the sub-station and distributing lines for serving new and additional customers in this municipality, a special bank of transformers having been provided for serving the Portland Cement Company.

The demand for power in this municipality was increased during the year 1919 by approximately 50 per cent. over 1918 conditions, and arrangements are now being made to enlarge the sub-station for the purpose of providing additional capacity to serve a much greater demand for the year 1920.

Waterworks Pumping

A preliminary report was made on the addition of an electric pumping unit to the present hydraulic operated power pumps for fire and commercial service, and on the removal of the present station to a more suitable site in the near future.

Neustadt

The distribution system in this municipality was placed in operation in November, 1918, the demand during this month being approximately 10 horse-power.

The demand established in this municipality in October, 1919, was 64 horse-power, and arrangements are being made to extend the distribution system for the purpose of taking care of an additional power customer, which will create a total demand for this municipality in excess of 100 horse-power.

Owen Sound

Estimates and reports were prepared and submitted, and investigations made, concerning the delivery of 1,000 horse-power to a large industry in this municipality, and indications are at the present time that this load will be secured, and that the total demand at the local sub-station will be increased by 100 per cent. during the coming year.

Priceville

Estimates and rates were prepared and submitted to the local officials covering the installation of a Hydro-Electric System, and the delivery of power thereto from the Eugenia Development.

Assistance was given the local officials in connection with the preparation of money and enabling by-laws, which will be submitted to the ratepayers early in the coming year.

Wingham

Estimates and rates were prepared and submitted to the local officials in connection with rebuilding the local distribution system and providing for Hydro-Electric service from the Eugenia System.

Money and enabling by-laws were submitted to the ratepayers in Wingham on October 17, 1919, and carried almost unanimously.

Assistance was rendered to the local officials by the Commission in connection with placing these by-laws before the electors.

It is expected that the Eugenia transmission lines will be extended throughout the Bruce County District during the coming year, and provision is being made to serve the municipality from this extension.

SEVERN SYSTEM

GENERAL

The district served by the Severn System enjoyed a very successful and prosperous year, from a standpoint of operation of the various local utilities.

The placing in operation of the new 1,600-k.va. generator in the Big Chute Power House enabled the Commission to provide for the increasing demands for power and lighting in the various municipalities served.

The loss of load due to the closing down of munition plants was almost immediately absorbed by the requirements of new and existing industries, and in one municipality only is the average load for the year 1919 less than the previous year, and it is quite probable that new industries in this particular municipality, as well as additional requirements of present industries, will create a demand during the coming year equal to, if not greater than the peak established during the period when the greatest amount of power was being used in the manufacture of munitions.

The towns and villages connected to the system during the close of 1918 have made an excellent showing during 1919, and there is every prospect of a much greater consumption of electrical energy in these towns in the future for supplying lighting and power customers.

Assistance and engineering advice was given to the following municipalities, concerning the construction of extensions for serving new and existing customers, and in the operation and management of the local utilities, and engineers of the department made periodical trips to these municipalities for this purpose. Assistance was also given to the local officials of these municipalities in soliciting new power customers and supplying information to same, in the nature of cost of power, cost of installation of electrical equipment, the most economical methods covering the use of electrical power, and other matters of similar nature:

Alliston, Beeton, Barrie, Bradford, Cookstown, Creemore, Collingwood, Coldwater, Elmvale, Midland, Penetang, Port McNicoll, Stayner, Thornton, Tottenham, Waubauskene, Victoria Harbor.

Estimates were prepared, investigations made, and engineering advice submitted concerning the supplying of power to the following rural communities and townships:

Essa, Innisfil, West Gwillimbury, Vespra, Nottawasaga.

A new agreement with the Town of Orillia was prepared covering the transfer of power from the Wasdell's System to the Big Chute Development by means of the Orillia transmission lines and generating station for the purpose of utilizing the surplus power of the Wasdell's Development on the Severn System. This agreement also covered the purchase of surplus power from the Orillia System when same was required for serving the municipalities of the Severn System, as well as the paralleling of the Eugenia, Severn and Wasdell's Developments with the Orillia System for standby service. The agreement was approved by the Commission and submitted to the Orillia Water and Light Commission for completion, and became effective November 1, 1918.

An analysis of the operating statements of the various municipalities mentioned above was prepared for the purpose of investigating the application of the lighting and power rates, as well as rates charged for the operation of the street lighting system and the waterworks pumps. As a result of this analysis the

Commission was enabled to authorize a reduction of local rates in various municipalities, as well as a refund to the corporations of all amounts collected in excess of cost for energy supplied to the street lighting and waterworks systems in accordance with the legislation governing same.

Alliston

Special assistance was given to the local officials in connection with making extensions to the local distribution system for serving a number of additional power customers, and as a result of these extensions, the demand for power in this municipality at the close of the year 1919 had increased by approximately 100 per cent. over and above the corresponding period of 1918.

Bradford

As the utility in this municipality was placed in operation one and a half months prior to the issue of the last annual report, it was found necessary to assist the local officials in securing power and lighting customers for the purpose of placing the local system on a sound financial basis. Estimates were prepared, investigations made, and information was submitted to the local officials and to various prospective power customers, and as a result of same there is every evidence that a large demand for power will exist in this municipality at the close of the coming year, and arrangements are now being made to serve a large existing industry, as well as supplying electrical energy to two new additional industries.

Collingwood

The local demand for power in this municipality was considerably affected by the loss by fire of one of the large industries, as well as the closing down of the steel plant which was engaged in the manufacture of munitions.

Estimates were prepared and submitted, investigations made, and engineering advice given concerning supplying power to the new steel plant and the extension of the local sub-station.

The addition of two large electrically driven air compressors to the equipment of the Shipbuilding Company compensated to a great extent for the loss of load formerly utilized by munition plants.

Penetang

Special assistance was given to the local officials of this municipality in addition to that mentioned elsewhere in this report under general conditions, covering an extension to the distribution system for the purpose of serving 1,000 horse-power to a large industry, which will require additional transmission line and sub-station capacity, and a study of existing and future demands was made, to determine the requirements in lines and sub-station equipment necessary to supply the increased demands of existing customers. Industrial conditions in this municipality indicate an increase in the demand for power in the near future, of approximately 200 per cent.

WASDELL'S SYSTEM

GENERAL

The results of the year's operation of the Wasdell's System are indicative of great progress in the future. Demands for light and power in various towns already served show an increase over 1918, and a very active campaign for securing distribution of electrical energy to rural communities was carried to a successful issue by certain portions of the district with the assistance of the Commission.

A large power consumer was secured and arrangements completed for serving two additional towns, two additional villages, as well as extending the system to serve five new townships and one additional township already being served partially.

An investigation was made to determine the extent of land damages caused by the flooded area above the dam of the Wasdell's Development, so that all differences between the Commission and the various property owners affected might be settled on an equitable basis.

A new agreement was prepared, approved by the Commission, and submitted to the Water and Light Commission of Orillia, covering the sale of surplus power by the Wasdell's to the Severn System, and the general interchange of power between the two systems by means of utilizing the Orillia transmission lines and generating station. This agreement became effective November 1, 1918.

Assistance and engineering advice was given to the following municipalities concerning the construction of extensions for serving new and existing customers, and the operation and management of the local distribution systems, and engineers of the department made periodical trips to the various municipalities for this purpose.

Assistance was also given to the local officials in soliciting new power customers and in supplying information to same in the nature of cost of power, cost of installation of electrical equipment, the most economical methods covering the use of power and other matters of similar nature:

Beaverton, Brechin, Cannington, Sunderland, Woodville, Brock Township, Thorah Township, Mara Township.

Estimates were prepared, investigations made, and engineering advice submitted concerning the supply of power to the following rural communities and townships:

Eldon, East Gwillimbury, Mariposa, Reach, Scott, Uxbridge, and an extension in Brock Township.

Assistance and engineering advice was also given to the following municipalities in connection with securing Hydro-Electric service:

Kirkfield, Port Perry, Uxbridge.

Brock Township

An extension to the existing rural lines in Brock Township was arranged for and completed for the purpose of serving seven farms west of the Village of Sunderland.

Petitions were received from a large section of the township located northwest of the section already being served, and estimates were prepared and investigations made for the purpose of constructing extensions to the existing system to serve these prospective users.

Eldon Township

In response to requests of the Township Council and various individuals in the township, an investigation was made and estimates prepared covering the construction of a high tension line through the Township of Eldon from Gamebridge to the plant of the Crushed Stone, Limited, approximately $11\frac{1}{2}$ miles northeast of Kirkfield, for the purpose of serving this company with a large block of power, as well as the Police Village of Kirkfield, and various hamlets and individual farms throughout the township south of the proposed extension.

After various conferences, arrangements were completed for closing the contract with the Crushed Stone, Limited, and with the township, and it is expected that this extension will be constructed early in the coming year.

Estimates were also prepared and investigations made covering service to the southern portion of Eldon Township in the vicinity of the Hamlet of Lorneville.

This section will be served by an extension of the 4,000-volt line running northeast from the Cannington Sub-station and serving the Village of Woodville.

It is expected that the Lorneville extension will be constructed early in the new year.

Kirkfield

Estimates were prepared, investigations made, and assistance given to the local officials of the Police Village of Kirkfield, in connection with securing Hydro-Electric service, and arrangements are being made by the local officials to submit money and enabling by-laws at the next municipal elections in January, 1920. This village will be served by a 4,000-volt feeder from a sub-station located at the plant of the Crushed Stone, Limited.

Scott Township

Estimates were prepared and investigations made at the request of the Township Council, and a large number of petitioners, covering service to various farms and hamlets throughout the township.

A survey was made by the Commission's engineers to determine the possible number of users, and as a result arrangements are being made to construct a distribution system within the limits of the township, providing that a sufficient number of individual contracts can be secured.

According to the indications at the close of the fiscal year, construction work will be undertaken in the spring of 1920.

Port Perry

Estimates were prepared and investigations made concerning supplying Hydro-Electric power to this municipality, and assistance was rendered to the local officials for the purpose of submitting money and enabling by-laws at the next municipal elections.

Uxbridge

Estimates were prepared and investigations made concerning the extension of the Wasdell's transmission lines to the Village of Uxbridge, for the purpose of serving this municipality, as well as the Township of Scott and adjacent rural communities.

Assistance was given to the local officials in connection with the submitting of money and enabling by-laws at the next municipal elections.

MUSKOKA SYSTEM

GENERAL

Assistance and engineering advice was given to the municipalities of Gravenhurst and Huntsville, which comprise the Muskoka System, concerning construction and extensions for serving new customers, and the operation and management of the local distribution systems, and engineers of the department made periodical trips to both places for this purpose.

Assistance was also given to the local officials in soliciting new power customers, and in supplying information to them, in the nature of the cost of power, cost of installation of electrical equipment, the most economical methods of using power, and other matters of a similar nature.

Gravenhurst

Special assistance and engineering advice was given to the local officials in connection with supplying power to the Potash Company, which concern desired a large amount of power for the purpose of operating electric furnaces.

Estimates concerning the cost of power, cost of installation, and cost of operation, were submitted to the company.

Huntsville

Special investigation was made and reports submitted concerning supplying power to the Anglo-Canadian Leather Company, which concern utilizes the bulk of the power supplied to this municipality.

THUNDER BAY SYSTEM

(Formerly Port Arthur System)

Port Arthur

Assistance was given to local officials in connection with the installation of electrical equipment in the elevator of the Canadian National Railways.

An investigation was made concerning the location of a suitable sub-station site for delivery of power from the new Nipigon Development now under construction.

Arrangements were made for securing additional power to supply the increasing demands of the various customers supplied by the local utility.

Assistance was also given the municipality in connection with securing power for a large industry, which will be served from the new Nipigon Development when completed.

Nipigon Village

Estimates were prepared covering the cost of delivering large blocks of power to this village on completion of the Nipigon Development.

Due to the fact that certain features of design have not yet been determined, the investigation concerning the delivery of this power is still in progress, and the results will be submitted to the local officials early in the new year.

CENTRAL ONTARIO SYSTEM

Belleville

Owing to the completion of the installation of electrically driven pumping units at the Municipal Water Works, a new circuit has been constructed from the Belleville Sub-station to the Water Works Pumping Station, thus duplicating the supply.

Waterworks Pumping

The installation of equipment described in the two previous reports has been completed and is in full operation.

Bloomfield

Service was first supplied in this municipality on March 25, 1919. The power and lighting load has developed rapidly and 55 h.p. is now being regularly used.

Campbellford

Pulp Mill

A save-all for the treatment of white water has been installed at the mill of the Northumberland Pulp Company, housed in an annex between the grinder and machine rooms. The save-all was supplied by the Hydraulic Machinery Company, of Montreal, and conveyers and accessories were built by the pulp company's staff, the estimated cost being about \$3,500,

Hastings

At the request of the municipality, estimates were prepared covering the cost of supplying power to the municipality and a valuation of the present distribution system was made and negotiations carried on, on behalf of the municipality with the present owners, with a view to the purchase of the system by the municipality. By-laws are to be submitted at the beginning of the coming year to enter into a contract with the Commission and to purchase and remodel the distribution system.

Havelock

At the request of the municipality, estimates were prepared by the Commission covering a supply of power to the municipality and a valuation was made of the existing distribution system. Negotiations were also carried on, on behalf of the municipality with the present owners with a view to the purchase of the system by the municipality. A Money By-law will be presented to the rate-payers at the beginning of the coming year for the purchase of the distribution system and remodelling of same. An Enabling By-law was previously submitted to and passed by the ratepayers.

Kingston

Rates for all classes of service were reduced by approximately 15 per cent. on January 1st, 1919.

In the month of April, a special demonstration of appliances was held with very satisfactory results and appliances are now being sold in large numbers.

The Local Commission applied to the Commission for approval of debentures for extensions to the street lighting system, to the amount of \$6,676.12. Approval was granted and the extensions have now been installed.

Electric service is now being used for the city pumping and for a period of nine months has shown a saving of \$563 over the cost of pumping by steam.

Lakefield

At the request of the municipality, estimates were prepared by the Commission of the cost of supplying power to the municipality and a valuation was made of the existing distribution system. An Enabling By-law was submitted to the ratepayers and passed and a Money By-law for the purchase of the distribution system and remodelling of same will be submitted to the ratepayers at the first of the coming year.

Lindsay

Progress has been made in removal of the old 1,100-volt distribution circuits in the municipality and replacement by 4,000-volt primaries. Only one circuit in the southeast section of the town remains to be changed over.

Marmora

On request of the municipality, estimates were prepared by the Commission covering the cost of supplying power to the municipality. An Enabling By-law and a Money By-law for the remodelling of the distribution system will be submitted to the ratepayers at the first of the coming year.

Norwood

On the request of the municipality, estimates were prepared by the Commission covering the cost of supplying power to the municipality. A valuation was also made of the present distribution system and negotiations were carried on by the Commission on behalf of the municipality for the purchase of the present distribution system. An Enabling By-law and a Money By-law for the issuing of debentures for the purchase of the distribution system and remodelling of same will be submitted to the ratepayers at the first of the coming year.

Oshawa

Owing to the largely increased load of General Motors of Canada, Limited, a new primary circuit has been constructed from the Oshawa Sub-station to the customer's factory. This customer has just completed the installation of one of the largest electric enamelling ovens in Canada.

Gas Plant

Owing to continuously increasing demand for gas it has been necessary to consider extensions to mains and plant; to mains, in the form of high-pressure feeders some of which are already laid, and to plant, in the form of reduction in labor of coal handling, by the installation of a pit under the railway siding and a flight conveyor for unloading cars and removing the coal to the pile. This equipment is now complete.

An outer lift is on order for the gas holder, which will double the capacity, the present holder to be transformed into a flying lift.

Peterboro

All the pole lines of the Public Utilities Commission have been removed from the business section of George Street with the exception of a three-wire secondary system carried on the iron trolley poles. Transformers of 50 kv-a. capacity are located on the corners of the cross streets and a spare transformer is kept in readiness for emergency service. This construction has resulted in a decidedly improved appearance of the street.

A large amount of work has been done throughout the city in the improvement of the distribution system.

The Commission has completed the construction of an extension of the Charlotte street branch of the Peterboro Radial Railway on Monaghan Road from Charlotte street to Patterson street, and has purchased and put into operation, two new one-man cars. The operation of these cars having proved very successful, it is expected that during the coming year, ten more of the same type will be purchased to replace the present two-man cars.

Gas Plant

A system of coal transport from cars to storage yard is under consideration, new siding facilities having been secured by the purchase of additional property adjacent to the gas plant.

Complete new blast equipment has been installed consisting of a Sturtevant blower of 4,500-c.f. per minute, direct-connected to a 20 horse-power, C.G.E. motor, 60-cycle, 220-volt, running at 3,460 r.p.m.

A retaining wall has been built about the main holder tank to allow of access for inspection, this wall being of special construction, due to the unstable nature of the ground and the necessity of providing against any subsidence of an adjacent masonry tank, containing the relief holder.

Consideration is being given to special separating equipment for the waste water from the plant, owing to complaints of indications of oil discharged into the Otonabee River.

Picton

Service was first supplied to this municipality on March 6, 1919. At the request of the municipality a valuation of the existing distribution system was prepared by the Commission.

The power load is developing rapidly in this municipality and the Water Works Department is completing the installation of a turbine pump driven by a 100 h.p. motor.

Waterworks Pumping

Two units each of 600-g.p.m. capacity at 335 feet head have been furnished by Messrs. Goldie and McCulloch, and are now being installed complete with separate suctions to the water front and discharge connections to the existing main. A direct connected motor of 100 horse-power, 60-cycle, 3-phase, 2,200-volt, is mounted on the extended base of each pump. The motor starters are of the floor mounted type with the overload release attachments inside the case. The estimated cost of the installation is \$9,868.

Port Hope

A joint pole agreement has been entered into with the Bell Telephone Company for common occupancy of poles on Cavan street. This will make possible the removal of one line of poles from this thoroughfare.

Stirling

A report was made on several locations* for a proposed electric pumping unit for fire and commercial service, taking water from a creek which runs through the village.

Trenton

The Water Works system was purchased from the Commission by the municipality and the latter took possession on January 1, 1919.

Wellington

Service was first supplied to this municipality on April 17, 1919. The municipality purchased from the Niles Company, the direct-current distribution system formerly in operation and has practically completed the remodelling of this system and the construction of a new distribution system.

Rural

Petitions and applications for estimates have been received from townships listed below and estimates are in course of preparation:

Ameliaburg, Brighton, Camden, Darlington, Fenelon, Hallowell, Hamilton, Thurlow.

NIPISSING SYSTEM

GENERAL

Supervision of the Nipissing System was exercised by the engineers of the department, and engineering advice and assistance given the local manager from time to time in connection with the operation of the system in general, and the local distribution systems in the four municipalities comprising it.

North Bay

A very satisfactory increase in the demand for power was made in this municipality during the past year, as well as a very extensive increase in the sale of appliances. Extensions were made at various times to serve new and existing customers. Special investigations were carried out for the purpose of increasing the capacity of the generating plant to provide for existing and future requirements.

RIDEAU SYSTEM

GENERAL

Three municipalities are now receiving power from the Commission, two having been added during this year. The loads are increasing steadily in these towns and steam power is being replaced by electric drive in the manufacturing plants.

Up to the present all power is being purchased from the Rideau Power Company for Smith's Falls and Perth.

High Falls Development

The transmission line between Perth and High Falls was completed during the year and is used temporarily to supply power for construction purposes at High Falls.

The transmission line to Carleton Place was started in the spring of this year and is now practically complete.

The new brick sub-station at Perth was completed early in the year and has been placed in use to supply power to the town. Transformer equipment is also to be installed at the Carleton Place generating station to supply the municipality with power from the system. Equipment for the sub-station is transferred from Iroquois sub-station on the St. Lawrence System. It consists of three 250 k.va. transformers, 2,600-volt oil switch and arrestor.

Carleton Place

At the municipal elections on the first of the year the voters of Carleton Place approved of entering into an agreement with the Commission for a supply of power. A by-law to raise \$100,000 was also passed, providing for the purchase of the hydraulic plant and distribution system of H. Brown and Sons. Possession of this property was taken by the corporation on the first of May. The Commission negotiated with the municipal officials for the purchase of the generating plant, which was transferred also on May 1st.

The regulation of the river flow depends materially upon the manner of operating this plant. The control of the flow at this point is essential to the Rideau System in general and more particularly the High Falls generating plant. It was considered an advantage to control the storage at the head waters of the Mississippi for the particular benefit of High Falls plant. The flow below Carleton Place can be regulated at will from the Carleton Place plant.

The plant contains three vertical turbines of approximately 280 horse-power each, connected to a horizontal shaft through crown gears. Two belt driven generators are installed of 400-k.va. capacity.

The municipal officials have purchased a second system of poles and lines about the streets and are using the material to remodel and extend the existing plant.

Power supplied from the generating plant is insufficient to meet the requirements and no additional supply will be available until the sub-station has been completed. The existing plant is carrying a considerable load at present.

Perth

The municipality began to take power from the Commission's sub-station in February of this year and is receiving its total requirements from this source. A number of manufacturing plants have not yet changed to electric drive.

The existing hydraulic plants near Perth which were the source of its supply formerly were closed down to undergo repairs and remodelling. Former electrical equipment was 133-cycle machinery which was replaced with 60-cycle alternators purchased from other municipalities who had no further use for them. Unfortunate conditions and accidents have prevented any use being made of these plants but they will shortly be operated again. The steam electric plant has been discarded.

Work on the extensions to the distribution system was completed in early spring, and serious consideration by the municipal officials has been given to the

existing street lighting plant. Several estimates have been furnished by the Commission on the cost of a new system of street lighting. The present plant is being altered temporarily to give better service while some permanent steps are decided upon.

A number of manufacturing plants have converted their factories from steam to electric drive. A number of others are in the course of changing. The load of the municipality is growing and manufacturing plants have been extended thereby increasing their loads.

Smith's Falls

A new switchboard ordered by the municipality has been recently installed by the Commission at the request of the local Commission. This permits of operating the local plants in parallel with the Rideau System.

The water works commission has extended the pumping station by the addition of two electrically driven turbine pumps of 1,000 gallons capacity each. Seventy-five horse-power induction motors of 2,200 volts are used.

The distribution system has been extended to serve the Frost Malleable Iron Works. The C.P.R. has contracted for 125 horse-power to drive a compressor located in the machine shops.

Waterworks Pumping

Two units each of 1,000-I.g.p.m. capacity at 175 feet head for domestic service and one booster of 1,800-I.g.p.m. giving an additional head of 95 feet for fire have been installed with complete connections in the present pumping station and are now ready for operation. A 16-inch Venturi meter has been inserted in the town main and arrangements have been made to give supply through a 10-inch existing main to the C.P.R. tank separately from the town supply by one of the domestic units. The three units were supplied by the Canadian Fairbanks Morse Company and each pump is direct connected to a 75 horse-power Fairbanks motor operating with 60-cycle, 3-phase, 2,200-volt current.

The service is brought into the building through porcelain wall tubes direct to a steel box which contains the disconnecting switches, choke coils and 2,200-volt fuses. From this steel box, the circuit is carried in conduit to the automatic oil switch on the gallery, this oil switch being operated by a handle mounted on a panel directly below it on the pump-house floor. From the oil-switch, the circuit is carried to a steel box containing the instrument transformers and the bus. From this steel box separate circuits are carried to the motors. A small dry type transformer is used to supply 110 volts to the no-voltage release attachment of the starters and also for emergency lighting.

The pumps operate under a flooded suction, water being drawn either from the flume serving the present hydraulic operated pumps or direct from the forebay through a new intake.

The estimated cost of this installation and connections in the pump room, including the Venturi meter, was about \$13,100.

ST. LAWRENCE SYSTEM

Alexandria

Requests were received from the municipality for assistance in securing a supply of Hydro power. Estimates were prepared on the cost of power and a reconstructed distribution system. Enabling and money by-laws will be submitted to the ratepayers early in January, 1920. It is proposed to supply this town from the Commission's sub-station at Cornwall.

Apple Hill

Following requests from the police village of Apple Hill, for a supply of power, estimates on the cost of power and of a distribution system were prepared. Assistance was also given in the form of a valuation of the privately owned distribution system in the village. Enabling and money by-laws will be submitted early in January, 1920.

Athens

Further requests were received for a supply of power, to be delivered over a rural line from Brockville. Surveys of the district and village were completed and estimates on cost of power and local construction are well under way.

Brockville

An adequate supply of power for the town was procured when the Cornwall sub-station was put into operation in April, 1919. Since that time the load has increased from three hundred to one thousand horse-power, and it is expected that this amount will be doubled early in 1920.

Construction of rural lines out of Brockville is under way, to serve the Brockville Asylum Farm and St. Mary's College.

Casselman

A request has been received for an estimate on the cost of power to this village, to be served from proposed lines north of Cornwall. Preliminary surveys were made and data secured for estimating purposes.

Chesterville

The increasing load at Chesterville made it imperative to install a sub-station at this point, and change the line between Winchester and Chesterville from 4,000-volt to 26,400-volt operation. The new station was put into service in August, 1919, and has sufficient capacity to supply outgoing rural feeders for the district.

Cornwall

The lines of the St. Lawrence System were first supplied from the new Cornwall Transformer Station on April 31, 1919. The load of the Toronto Paper Company has grown from 100 to 300 horse-power, and this customer will shortly add another block of 100 horse-power.

Lancaster

Requests were received, early in the year, for an estimate on the cost of a power supply for the village. An estimate on the cost of a modern distribution was also prepared, and by-laws will be submitted to the ratepayers at the end of the year.

Lyn

Estimates are being prepared on the cost of power, and of a distribution system for the village.

Martintown

The police village of Martintown applied for a supply of power in connection with proposed lines north of Cornwall. Estimates were prepared and arrangements made to submit by-laws to the ratepayers at the end of the year.

Maxville

The village of Maxville was supplied with estimates on the cost of power and of a new distribution system. By-laws will be submitted to the ratepayers early in January, 1920.

Prescott

Inquiries have been received and estimates prepared on the cost of a block of from 400 to 800 horse-power a short distance east of the town.

Winchester

A limited section of ornamental street lighting is being installed.

Winchester Springs

Estimates on the cost of power, and a modern distribution system, have been prepared.

NEW ONTARIO DISTRICT

GENERAL

A general report was prepared and submitted giving the possibilities of developments throughout the district known as New Ontario, including the location of undeveloped water power sites, and the available capacity of each, as well as details of equipment, and other information concerning existing developments.

Capreol

Engineering advice and assistance was given this municipality concerning the installation of a distribution system to be served by electrical energy from the shops of the Canadian National Railways. Various trips were made to the village by an engineer of the department for this purpose, and estimates covering the capital required to provide for distributing lines, etc., were submitted.

Gore Bay

An estimate was prepared and submitted to the municipality covering the cost of constructing a distribution system in this municipality, and engineering advice was given concerning the delivery of Hydro power.

Monteith

A complete report was prepared and submitted to the Department of Agriculture covering the cost of construction and development of a distribution system at Monteith, for the purpose of serving the Demonstration Farm and Military Training Station at that location.

Sault Ste. Marie

Special assistance and engineering advice was given this municipality in connection with adjusting rates charged by the local commission to its various lighting and power consumers. An analysis of past operating statements was prepared and submitted, together with revised rates. An investigation was also made concerning an improved street lighting system in the municipality, and a report submitted to the local officials in this connection.

SECTION VII

GENERAL ACTIVITIES OF THE COMMISSION

ELECTRICAL INSPECTION

During the fiscal year ending October 31, 1919, there has been a very decided increase not only in the actual work performed but in the revenue. It was found that the inspection fees were not at all commensurate with the services rendered or the actual cost of such service, and a new scale of fees was promulgated during the last half of the year, and after due consideration put into effect on October 1st.

During the year there has been recorded a total of 135,804 inspections, which have covered all parts of the Province. In addition to the foregoing were many thousand promiscuous inspections on old work for purposes of investigation, reports for Fire Chiefs, the Fire Marshall and others for which no fee is provided. The work of bringing about corrections on old installations for the purpose of removing danger to life and property has been carried out as in former years.

During the year the sum of \$187,767.19 has been expended by owners of buildings and others on remodelling or overhauling old defective electrical installations. This figure, while approximate, is fairly accurate and covers all the districts of the Province with the exception of the Districts of Hamilton and Toronto, in which districts no record has been kept of this work.

Notwithstanding the fact that during the last two months the work in all districts has nearly doubled, and in some cases more, in only one district has there been any increase in the staff of inspectors. In fact, in one case we have found it expedient to dispense with one inspector as well as his office and attach it to the next district with a corresponding saving, but owing to the unprecedented and unexpected continuance of this great rush of work it may be necessary to open further districts to take care of it.

Several vacancies occurred during the year and one man retired through illness, all of which, like previous years, have been filled with returned soldiers who are doing well. Great pains have been taken by all inspectors to assist in training these men and at the end of the year we had twelve returned men on the staff. In filling vacancies only applications from soldiers have so far been considered.

During the year a new edition of Rules and Regulations was published. The last edition was distributed gratuitously but as several thousand copies are required it was deemed advisable to make a small charge in future. The entire edition was sold out in a few days and a further reprint is now on the press.

Twenty-five persons have been summoned before magistrates for open violation of the Rules and Regulations and in all cases convictions have been secured. In no case have offenders been summoned unless it was for open violations and where no reasonable excuse could be offered. Some offenders have been apprehended and let off with warnings where there was reasonable doubt of their intention of breaking the law, but in a few cases of deliberate violations some heavy fines have been registered.

The closest co-operation has existed between the Inspection Department and the Laboratories and the close of the year marks a very busy and successful season and much good has been accomplished and many difficulties successfully overcome. All members of the staff have expended their best efforts to meet the great increase of work.

RURAL POWER

Owing to the high cost of construction, the shortage of labor and the shortage of power in the Niagara District, the Commission's activities in connection with Rural power during the year were confined to the preparing of estimates, submitting of rates, general propaganda work and information to petitioners in the different parts of the Province.

Assistance was given in the building up of loads in the various townships where systems are in existence and being operated.

In the making of estimates on the basis of petitions received, it was found that in many cases service was rendered to a favored few to the exclusion of others. In order that a maximum area might be served from a distribution centre, it was found desirable to have investigation surveys made and the area divided into districts over which a uniform rate will apply. A number of such surveys were made and estimates prepared, based on the information obtained.

In the past, service has been given in rural districts on the basis of a uniform service charge and consumption rate. In order to obtain a more equitable distribution of the cost a new classification for users of Hydro-Electric service in rural districts was made as follows:

- Class 1.* HAMLET LIGHTING—Including all contracts where four or more consumers are fed off one transformer for house lighting only. Farmers and power customers shall not receive service under this class.
- Class 2.* HOUSE LIGHTING—Including all contracts where residences are served that cannot be grouped as in hamlets. Farmers and power customers shall not receive service under this class.
- Class 3.* FARM LIGHTING—Including the lighting and the operation of miscellaneous small equipment of a residence and out-buildings on a farm.
- Class 4.* LIGHTING AND COOKING—Including the lighting and the operation of miscellaneous small equipment of a residence and out-buildings on a farm and service to an electric range.
- Class 5.* LIGHT FARM SERVICE—Including the lighting and the operation of miscellaneous small equipment of a residence and out-buildings on a farm and service to a 5-horse-power motor, but not an electric range or electric heaters.
- Class 6.* MEDIUM FARM SERVICE—Including the lighting and the operation of miscellaneous small equipment of a residence and out-buildings on a farm and service to a 5-horse-power motor and an electric range, or to a 10-horse-power motor without the electric range or electric heaters.
- Class 7.* HEAVY FARM SERVICE—Including the lighting and the operation of miscellaneous small equipment of a residence and out-buildings on a farm and service to a 10 or 20-horse-power motor and an electric range.
- Class 8.* SYNDICATE OUTFITS—Will include any of the foregoing classes which may join in the use of a syndicate outfit as long as the summation of their relative class demands is equal to the kilowatt capacity of the syndicate motor.

The Commission also submits details of the uses of power by three syndicates in Waterloo Township, showing the work done and the cost of this in the following tables:

Waterloo Township Syndicate No. 1

WORK DONE BY 20-H.P. MOTOR, FROM DECEMBER, 1918 TO NOVEMBER, 1919

No. 1 Farm

Silo filling	12' x 42' silo filled, settled and refilled.
Threshing	400 bushels wheat.
	900 " oats.
	1,800 " mixed grain.
	300 " barley.
	100 " peas.
Chopping	1,800 "
Sawing wood	25 cords.

No. 2 Farm

Silo filling	14' x 39' silo filled, settled and refilled twice.
Threshing	600 bushels wheat.
	1,800 " mixed grain.
	800 " barley.
	800 " oats.
	30 " beans.
Chopping	2,500 "
Sawing wood	16 cords.

No. 3 Farm

Silo filling	12' x 40' silo, filled 35'.
Threshing	320 bushels wheat.
	1,500 " oats.
	2,600 " mixed grain.
	800 " barley.
	140 " buckwheat.
Chopping	2,500 "
Sawing wood	10 cords.

No. 4 Farm

Silo filling	8' x 22' and
	9' x 22' silos filled, settled and refilled.
Threshing	330 bushels wheat.
	1,200 " oats.
	400 " mixed grain.
	70 " buckwheat.
Chopping	1,500 "
Sawing wood	15 cords.

No. 5 Farm

Silo filling	11' x 30' silo filled.
Threshing	100 bushels buckwheat.
	1,200 " mixed grain.
	900 " oats.
Chopping	1,400 "
Sawing wood	20 cords.

No. 6 Farm

Silo filling	14' x 40' silo filled.
Threshing	400 bushels wheat.
	3,500 " mixed grain.
Sawing wood	10 cords.

No. 7 Farm

Silo filling	11' x 44' silo filled.
Threshing	100 bushels wheat.
	2,000 " mixed grain.

Waterloo Township Syndicate No. 2

WORK DONE BY 20-H.P. MOTOR, FROM DECEMBER, 1918 TO NOVEMBER, 1919

No. 1 Farm

Silo filling	12' x 40' and 12' x 40' silos filled.
Threshing	200 bushels wheat.
	800 " barley.
	300 " mixed grain.
	1,500 " oats.
Sawing wood	5 cords.

No. 2 Farm

Silo filling	12' x 30' silo filled, settled and refilled.
Threshing	1,200 bushels oats.
	1,200 " mixed grain.
Cutting straw	2 days.
Sawing wood	7 cords.

No. 3 Farm

Silo filling	12' x 42' silo filled, settled and refilled.
Threshing	100 bushels wheat.
	1,500 " oats.
	600 " barley.
Sawing wood	12 cords.

No. 4 Farm

	9' x 10' x 23' and
Silo filling	8' x 9' x 23' silos, filled, settled and refilled.
	1,500 bushels oats.
Threshing	500 " barley.
Sawing wood	8 cords.

No. 5 Farm

Silo filling	9' x 24' and 10' x 14' x 20' silos filled, settled and refilled.
Threshing	160 bushels wheat.
	1,500 " oats.
	600 " barley.
	400 " mixed grain.

No. 6 Farm

Silo filling	12' x 33' silo filled.
Threshing	175 bushels wheat.
	1,000 " oats.
	325 " barley.
	1,000 " mixed grain.
Chopping	2,300 "
Sawing wood	10 cords.

Waterloo Township Syndicate No. 3

WORK DONE BY 20-H.P. MOTOR, FROM DECEMBER, 1918 TO NOVEMBER, 1919

No. 1 Farm

Silo filling	12' x 30' silo filled, settled and refilled.
Threshing	150 bushels wheat.
	1,018 " oats.
	310 " barley.
	735 " mixed grain.
Chopping	12 hours, bushels not specified.

No. 2 Farm

Silo filling	12' x 36' silo filled.
Threshing	1,450 bushels oats.
	1,000 " barley.
Chopping	300 "

No. 3 Farm

Silo filling	11' x 25' silo filled.
	8' x 25' silo filled 12'.
Threshing	1,300 bushels mixed grain.
Chopping	900 "
Sawing wood	4 cords.

No. 4 Farm

Silo filling	10' x 16' x 30' silo filled, settled and refilled.
Threshing	15 bushels wheat.
	1,200 " oats.
	600 " barley.
	1,300 " mixed grain.
	40 " rye.
Chopping	2,500 "
Sawing wood	13 cords.

No. 5 Farm

Silo filling	12' x 28' silo filled.
Threshing	130 bushels wheat.
	1,000 " oats.
	700 " mixed grain.
	200 " barley.
	60 " peas.

No. 6 Farm

Silo filling	9' x 24' silo filled, settled and refilled.
Threshing	75 bushels wheat.
	1,200 " oats.
	700 " mixed grain.
Chopping	1,500 "
Sawing wood	13 cords.

Waterloo Township Syndicate No. 2

Uses of Power for Lighting, Small Power and Large Power Purposes from December, 1918, to November, 1919
Rate—Service Charge \$30.00 per year; Power 5c. per K. W. H. Discount 10% from Energy Charge only

POWER USED BY LIGHTING AND APPLIANCES

Kilowatt Hours

POWER USED BY LIGHTING AND APPLIANCES														Cost per Year				
Kilowatt Hours																		
Farm No.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total	Domestic	5 H.P. Motor	20 H.P. Motor	Service Charge	Total
1	57	44	39	42	32	24	27	33	28	36	49	54	465	\$20.93	\$16.65	\$25.83	\$30.00	\$93.41
2	62	57	49	44	39	22	19	22	24	26	53	57	474	21.33	22.05	23.04	30.00	96.42
3	36	33	31	22	17	12	13	12	14	16	28	34	268	12.06	14.40	15.98	30.00	72.44
4	41	35	29	25	18	12	12	6	10	10	30	35	263	11.83	27.45	16.15	30.00	85.43
5	30	30	12	39	20	15	7	4	6	8	6	15	192	8.64	14.40	12.33	30.00	65.37
6	60	54	51	52	49	44	43	34	39	42	42	47	557	25.07	.....	34.92	30.00	89.99
Total	286	253	211	224	175	129	121	111	121	138	208	242	2,219	\$99.86	\$94.95	\$128.25	\$180.00	\$503.06

POWER USED BY 5 H.P. MOTOR

Kilowatt Hours

1	40	30	40	50	70	10	20	30	.....	10	40	30	370	.....	\$16.65	.....	.....	.....
2	70	70	50	60	80	40	20	10	30	20	10	30	490	.....	22.05	.....	.....	.....
3	40	40	40	20	40	20	10	30	30	30	10	10	320	.....	14.40	.....	.....	.....
4	60	70	80	80	70	60	30	30	30	20	50	30	610	.....	27.45	.....	.....	.....
5	30	30	40	30	20	30	30	20	40	30	10	10	320	.....	14.40	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	240	240	250	240	280	160	110	120	130	110	120	110	2,110	.....	\$94.95	.....	.....	.....

POWER USED BY 20 H.P. SYNDICATE OUTFIT DOING WORK AS PER ACCOMPANYING TABLE

Kilowatt Hours

1	364	.....	.....	10	.....	.....	.....	.....	110	90	.....	.....	574	.....	.....	.....	.....	.....
2	71	124	.....	115	.....	23	10	45	32	83	9	.....	512	.....	.....	\$25.83	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	105	.....	250	355	.....	.....	23.04	.....	.....
4	.....	.....	.....	24	.....	.....	.....	73	.....	129	.....	133	359	.....	.....	15.98	.....	.....
5	26	94	.....	.....	.....	.....	.....	.....	37	84	.....	33	274	.....	.....	16.15	.....	.....
6	118	.....	55	88	89	43	32	33	.....	96	41	181	776	.....	.....	12.33	.....	.....
Total	579	218	55	237	89	66	42	151	179	587	50	597	2,850	.....	.....	\$128.25	.....	.....

EQUIPMENT ON FARMS

- 1.—5 H.P. 3 phase motor, washing machine, iron, toaster
- 2.—5 H.P. 3 " " " "
- 3.—5 H.P. 3 " " " "
- 4.—5 H.P. 3 phase motor, iron, toaster
- 5.—5 H.P. 3 " " " "
- 6.—2-1 H.P. 1 phase motor, on lighting circuit, iron, toaster.

Waterloo Township—Syndicate No 3.

Uses of Power for Lighting, Small Power and Large Power Purposes from December, 1918, to November, 1919
Rate—Service Charge \$30.00 per year; Power 5c. per K.W.H. Discount 10% from Energy Charge only

POWER USED BY LIGHTING AND APPLIANCES

Cost per Year

Farm No.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Total	Domestic	5 H.P. Motor	20 H.P. Motor	Service Charge	Total
1	49	43	42	38	34	21	28	33	34	32	39	41	434	\$19.53	.....	\$8.64	\$30.00	\$58.17
2	48	43	41	37	30	21	16	16	10	27	39	50	388	17.46	.....	7.52	30.00	54.98
3	41	43	32	27	20	13	9	9	10	15	20	26	365	11.93	.....	38.79	30.00	80.72
4	44	41	39	35	28	20	15	19	19	24	41	43	368	16.56	.....	34.74	30.00	81.30
5	76	71	66	59	46	27	26	20	19	29	45	67	551	24.80	9.40	10.22	30.00	74.42
6	61	61	49	47	37	28	30	37	34	43	60	58	545	20.03	.....	24.47	30.00	74.50
Total	319	302	269	243	195	130	124	134	136	170	244	285	2,551	\$110.31	\$9.40	\$124.38	\$180.00	\$424.09

POWER USED BY 5 H.P. MOTOR

Kilowatt Hours

1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	10	30	20	20	30	20	10	10	10	20	20	9	209	.....	.....	.....	.....	.....
6	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Total	10	30	20	20	30	20	10	10	10	20	20	9	209	.....	\$9.40	.....	.....	.....

POWER USED BY 20-H.P. SYNDICATE OUTFIT DOING WORK AS PER ACCOMPANYING TABLE

Kilowatt Hours

1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	205	63	31	118	55	.....	.....	101	.....	94	.....	73	167	.....	.....	\$ 8.64	.....	.....
4	104	144	21	31	211	19	27	107	14	56	19	234	862	.....	.....	38.79	.....	.....
5	.....	.....	.....	.....	.....	.....	.....	.....	73	59	.....	95	227	.....	.....	34.74	.....	.....
6	25	200	.....	55	42	44	19	58	.....	74	.....	49	566	.....	.....	10.22	.....	.....
Total	334	407	52	204	308	63	46	266	124	404	19	559	2,786	.....	.....	\$124.38	.....	.....

EQUIPMENT ON FARMS

No. 1.—1 H.P. single phase motor on lighting circuit, iron, toaster.

2—

3—1 H.P. single phase motor on lighting circuit

No. 4—1 H.P. single phase motor on lighting circuit, iron, toaster.

5—5 H.P. three

6—1 H.P. single

ELECTRIC RAILWAY WORK

As recorded in previous reports, the work of this department was curtailed during the war to a positive minimum. Such action was not only ordered by the Commission but was called for by an Act of the Legislature. Early in the Spring of this year various municipalities made requests that the lines that had been voted upon should be constructed and the sections of the Act, above referred to, were therefore repealed. At the same time the municipalities were also given authority to construct lines even though one or more municipalities interested did not carry the necessary by-laws, but provided that such action to proceed was endorsed by an Order-in-Council and that municipalities that did carry their by-laws were responsible for at least ninety per cent. of the guarantee.

As soon as the amended legislation was passed the staff of the department was increased and the work of completing estimates and specifications, interrupted by the war, was recommenced. The following is a summary of the more important work carried on during the year.

Toronto Eastern Lines

The Act of 1915 authorized nine municipalities in this district to construct and operate an 80-mile line extending from East Toronto to Stouffville, Port Perry and Whitby, but at the time a satisfactory entrance to the City of Toronto was found too expensive for such a short line and, therefore, construction was not commenced. The Mackenzie-Mann interests were building a 45-mile line due east, from Toronto to Bowmanville and an attempt was made to buy out this line and amalgamate it with the municipal line, but the owners wanted too high a price and negotiations failed.

Shortly after the Dominion Government bought the C.N.R., in 1918, the subsidiary line to Bowmanville was also secured, and the nine municipalities at once requested that it should be taken over as originally desired. The Dominion Government was consulted and Hon. Dr. Reid, the Minister of Railways and Canals, agreed to recommend the transfer on the basis of actual cost. Rails are already laid for fourteen miles between Bowmanville and Whitby, and grading carried five miles further west to Pickering Village, while land for the right-of-way has been purchased still further to Scarboro. No definite decision was made public as to the route from Pickering to Toronto but it was understood that the line would enter the city in the north end and probably use the C.P.R. station at North Toronto. The great majority of people who would use the road would wish, of course, to land downtown, and estimates were, therefore, prepared with this in view. The Toronto Harbor Commission is making provision for highspeed entrances for such radial lines, and by-laws have already been passed covering the construction of a line from the Humber River on the west, to a large modern terminal near the foot of Yonge street. After careful investigation it was found possible to recommend the continuation of the line from Pickering to East Toronto and then southwards under the G.T.R. near Coxwell avenue to meet the Harbor Board's property near the Woodbine, and so access can be secured direct to the interurban terminal above mentioned.

Estimates were completed on this route and indicated it would cost \$8,360,794 to purchase the existing construction, complete the line to Toronto and provide the rolling stock and equipment necessary to commence service. The distance from Toronto to the centre of Bowmanville would be 43.5 miles, which is somewhat

shorter than the existing lines. The annual revenue was estimated at \$1,118,003 and the operating expenses and interest at \$1,076,175.

The above details were given to delegates from the councils of the ten municipalities interested and on their request the Commission agreed to prepare by-laws to allow the undertaking to be submitted to the electors. This work is now being carried on and by-laws will be voted upon in all places by January next. Pickering Township voted on October 14th and carried the by-law by 383 to 130. Many of the municipalities voting are interested as well in the line to Stouffville and Port Perry and are supporting the Bowmanville line because it will provide the city entrance for the first mentioned road. It is hoped that the Dominion Government will turn over the G.T.R. lines in this northern district when they have been acquired, and so permit the early operation of such by electric power as well as avoiding unnecessary duplication.

The municipalities east of Bowmanville, particularly in the Peterboro, Warkworth and Prince Edward County districts, are also much interested in the line now being voted upon as they believe it can be extended eastward and form the main line of a system from which the branch lines in which they are interested can be built. Some meetings to promote such lines have already been held and preliminary traffic studies have been made but nothing definite can be done until the present proposition has been placed in operation.

Toronto-Niagara Lines

The Townships of Nelson and Saltfleet and the City of Hamilton failed to carry their by-laws for the Toronto-Niagara line when they were submitted in January, 1917, although the other municipalities did so by large majorities. It was felt that these by-laws failed because time did not permit the ratepayers to be properly informed and arrangements were therefore, made to hold a re-vote in March of this year. The campaign in the City of Hamilton was a very strenuous one—the opponents of public ownership making a determined stand against it. This necessitated the committee in charge bending all their efforts on the city campaign and leaving the townships to explain the proposition to the electors as best they could. Matters were made still more difficult by Saltfleet deciding the whole township should vote, although the line only passed along one side. Nelson Township only voted a section and, along with Hamilton, carried the by-law by a large majority. The vote in Saltfleet stood 104 for and 241 against, and it was felt by the other municipalities that they should take advantage of the Act and proceed with the line. All the councils between Toronto and St. Catharines passed resolutions to this effect and an Order-in-Council has been secured authorizing the Commission to issue the necessary bonds and proceed with the construction. Final surveys are now being made, options secured on land for right-of-way and the municipalities are signing the debentures so the bonds can be sold and active work commenced in the spring.

The City of Hamilton has requested the Commission to commence construction of spur lines in the industrial district of that city and to make arrangements with the steam lines to operate them pending construction of the main line. The ratepayers are most desirous of utilizing the Grand Trunk tracks instead of building a new line and the Commission has agreed to such action if satisfactory terms can be arranged with that road. Inasmuch as the Grand Trunk is now practically owned by the Dominion Government it is hoped that this plan can be accomplished, thereby saving duplication and permitting of all the freight business in the city being performed by electric service in a most efficient manner.

The eight municipalities interested in the 28-mile line between Welland and Port Colborne and Bridgeburg, and all of which carried their by-laws in January, 1917, are anxious to have the line constructed as soon as possible. Before commencing active work it appears advisable to see what disposition will be made of the G.T.R. and Niagara-St. Catharines lines, now owned by the Dominion Government—and possibly some of these may be acquired—thus avoiding duplication, as well as effecting a considerable saving in cost and a consequent lowering of the annual charges for interest. The Minister of Railways at Ottawa has stated that he is most desirous of avoiding duplication and believes that the Hydro Radials should be good feeders to the trunk lines under his control, so there is every reason to expect that some of these lines can be acquired.

The lines between St. Catharines and Niagara Falls, and between St. Catharines and Welland, have never been finally reported upon, but surveys and estimates have been completed as well as traffic studies. These lines will also be held in abeyance until the future of the G.T.R. and Niagara-St. Catharines roads is settled.

Toronto-London Line

Some thirty-one municipalities are interested in this line, but due to lack of time to explain the proposition to so many municipalities voting at once, and also because the line only passed near some of the townships, the voting resulted in only 90 per cent. of the guarantee being carried by the electors. The six municipalities between Toronto and Port Credit have passed resolutions asking that their portion of the line be united with the Niagara line so that construction and operation may be commenced at once. The remaining portion of the line closely parallels the G.T.R. and decision as to its construction has been left in abeyance, as again there is the possibility that the G.T.R. can be used instead of building a new road. Meanwhile some of the municipalities have passed resolutions agreeing to take their share of the guarantee of the townships that failed to carry the by-law.

Hamilton-Elmira and Guelph Line

A preliminary report on a section of this line was made in 1916 to delegates assembled at Hamilton. The City of Galt was instrumental in having these estimates brought up to date and the proposition definitely gone ahead with. Delegates assembled at Galt in the fall and were advised to build a line from Hamilton through Dundas, Galt and Kitchener to Elmira, with a branch through Preston and Hespeler to Guelph. The capital cost of this 75-mile line is placed at \$6,530,659 and the annual revenue at \$971,247, with operating expenses and interest at \$894,903. By-laws will be presented to the councils of the seventeen municipalities interested next month, with the idea of having them voted upon at the annual elections in January. It is anticipated that the G.T.R. lines between Galt and Elmira as well as from Harrisburg to Guelph can be secured from the Dominion Government, thereby affecting a considerable saving in first cost and avoiding duplication.

Guelph Street Railway

This street railway consisting of some eight miles of track, was purchased by the city from private owners about 1903, the idea being to keep the franchise which had some very exclusive clauses, from falling into the hands of other private interests who might exploit the road, to the detriment of the city. The revenue secured has never been large, and during recent years with high costs of material

and labor, has failed to meet all its charges. The Grand Valley Railway, a subsidiary of the C.P.R., offered to take over the line and extend its own railway up from Hespeler with a spur to Puslinch Lake. The agreement providing for this arrangement was placed before the electors in September of this year. The terms stated that Guelph was required to pay any deficit as well as raise any money necessary for new lines or equipment that the C.P.R. might desire. The C.P.R. was to receive one half of any profits, and would have practically complete control. The proposition was voted down by 1,185 to 437.

Immediately after the by-law was defeated the council passed a resolution requesting the Commission to make a complete report on the condition of the road, its probable future earnings and expenses as well as suggestions for future control and management. Engineers and traffic men were sent to the city and a very careful survey was made of the property and books. After investigating various methods of operation the question was narrowed down to two or three schemes, and a report presented to the council setting forth the probable effect of each, if adopted. It was clearly seen that the large double-truck cars should be replaced by new one-man cars of less than one-half the weight. However, it was pointed out that even with the resultant savings in crew wages, power, etc., and also with increased earnings due to more frequent service, there would still be a deficit if all capital and depreciation charges were included.

The Commission recommended that the line be merged with the proposed Hamilton, Elmira and Guelph Radial mentioned above, as such a course should be beneficial to both. The Street Railway would be credited with the freight and passenger traffic handled by the Radial and the earnings thereby appreciably increased. The Radial should also be able to provide much more efficient management of the Street Railway at a considerable saving, and it would be to its benefit to do so as the Street Railway would provide a very satisfactory entrance for passenger cars as well as access to all industries for freight. The proposition will probably be placed before the electors at the annual elections in January next.

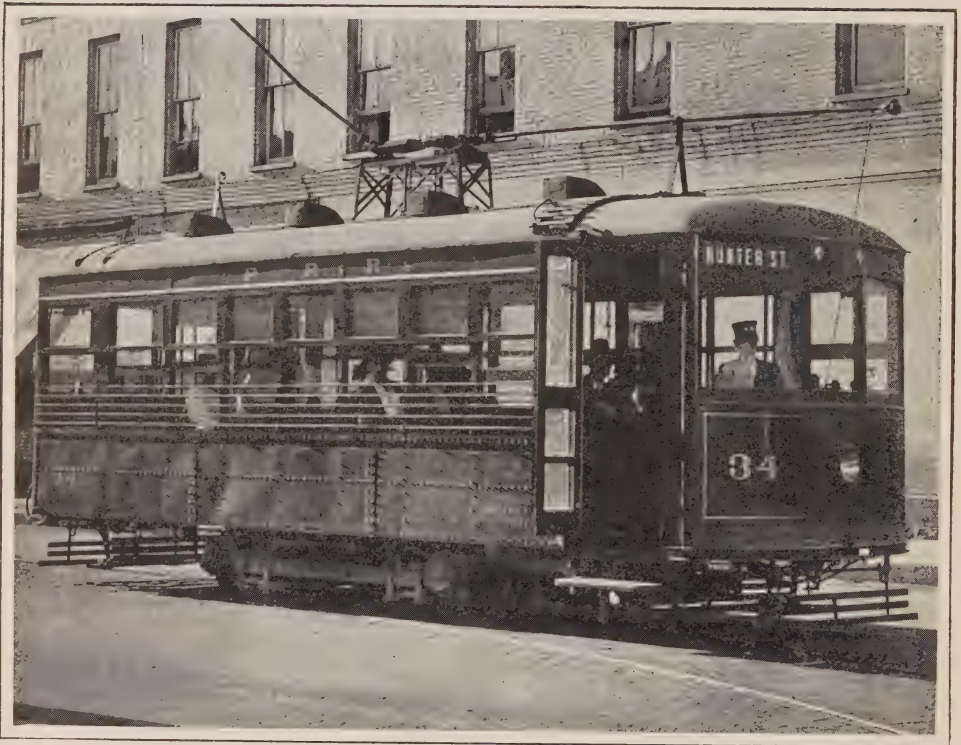
Sandwich, Windsor and Amherstburg Railway

This railway operates a 25-mile interurban line from Tecumseh through Windsor to Amherstburg and in addition has about ten miles of street railway track in Ford, Walkerville, Windsor and Sandwich. The different franchises in nine municipalities expire at various dates from 1922 onwards. The district is growing very fast and satisfactory arrangements for new tracks cannot be arranged. The municipalities have appointed committees a number of times to try and deal with the proposition and the Commission has also been requested to assist in the solution. Some two years ago the Commission's Engineers made a valuation of the property but the figures were never sent the municipalities as the company indicated that it was not prepared to sell out and it could not be forced to do so at that time. However, the high cost of labor and material during recent months so cut into the earnings that the Detroit United Railway Company, the owners of the road, finally decided to sell out if they could get a reasonable offer.

The Commission received requests from all the municipalities to act for them and engineers and traffic men were again sent to the district to collect information. This time the company placed all its records at our disposal and a very accurate estimate was made of cost of the property and its probable earning power in future years.

A sale price could not be agreed upon and negotiations were broken off for a month or so but finally the company agreed to accept \$2,039,000 of the Commission's $4\frac{1}{2}$ per cent., 40-year bonds as payment. A tentative agreement was drawn up, which is to be completed if the electors of the municipalities assent to by-laws that will be placed before them within the next month or six weeks. The estimates indicate that some \$250,000 will have to be spent to bring the line into fair operating shape and that the revenue for the next few years will be about \$500,000, which will be sufficient to cover all operating and interest charges.

There are many improvements necessary before the road will give first class service, the chief one of which is a satisfactory terminal near the Windsor Ferry Dock, but these alterations will not be attempted until the road is taken over and operated under the Commission's control.



One-Man Car, Peterborough Radial Railway.

Peterboro Street Railway

This road was purchased by the Ontario Government in 1916, along with the power system in the Eastern District, the whole undertaking being turned over to the Commission to operate. Anyone who has managed a street railway in a city of 20,000 will appreciate the difficulty of giving a service that satisfies the travelling public and yet pays for itself. When the property was taken over there were the usual requests for new tracks and cars, so engineers were detailed to make a careful investigation to see if the desired changes could be made. It was found that the service given was much better than supplied any other city of corresponding size, and that the revenue was really not sufficient to cover all legitimate charges.

It was found necessary, however, to purchase more cars to keep up the service, and after careful investigation it was decided to adopt the one-man safety type of car as a standard. The city officials co-operated with the Commission and this resulted in two such cars being purchased and placed in operation, which gives decidedly improved service over that supplied by the old type of car which they replaced.

Before placing an order for the new cars, a thorough study was made by the Mechanical Department of the various types found on different street railways that use such cars. Specifications were then prepared for both the mechanical and electrical equipment, and tenders were invited from all manufacturers who could supply such apparatus. At that time no Canadian line had purchased cars of this type and, therefore the Canadian companies were placed at a disadvantage in tendering, but now that three or four companies have purchased such cars it is expected that they should be produced in Canada as economically as in the United States. The two new cars that are now in service were purchased by the Mechanical Department who were also required to assist in instructing the crews in their operation as well as the shop force in the ordering of spare parts and maintenance.

MUNICIPAL WORK

MISCELLANEOUS

Almonte

The municipality has entered into negotiations for the purchase of the Wylie property. They propose to purchase this plant outright and operate it in parallel with the present municipal plant. A preliminary estimate of cost of reconstruction and general advice on the proposal was given by the Commission.

Pembroke

At the request of the municipality the Commission's engineers made investigations into the existing street lighting supplied by the Pembroke Electric Light Company. A replacement of the existing arc system by a series system was thought advisable. The municipality was also desirous of installing a "white way" on the main business street.

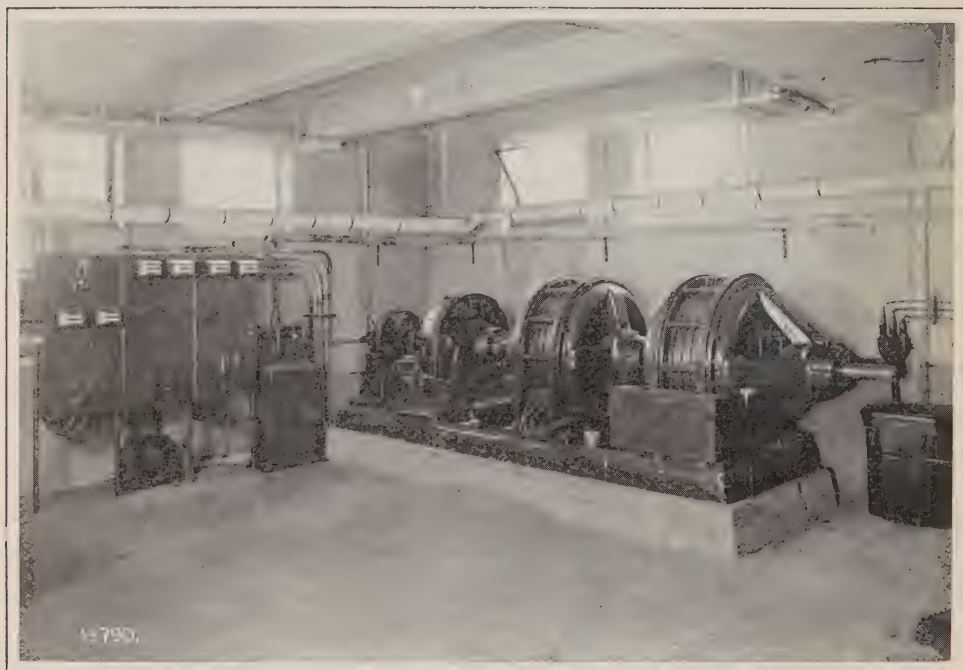
After various interviews between the municipal officials and the president of the company, an agreement was reached to have the overhead poles and wires removed from Pembroke and McKay streets to back streets. A pedestal lighting system consisting of approximately fifty standards of the Kingston-style equipped with 500-watt, 20-ampere, gas-filled lamps will be installed along these streets.

The remaining portions of the town will be lighted with suspended 400-watt, 7½-ampere, gas-filled units. Over one hundred and fifty of these will replace the arcs.

An agreement between the municipality and the company covering a period of ten years was drawn up. The Commission assisted the municipality in supplying technical advice, specifications for equipments, etc.

TESTING AND RESEARCH LABORATORIES

The reasons mentioned in the last Report have continued to operate toward the expansion of the functions of this department and of the volume of work required of it. As the testing facilities and staff have become adequate to undertake wider responsibilities, various classes of work heretofore carried on by other departments but which logically should form part of the duties of a testing and research department, have been turned over to this department. Thus the evolution of the Laboratories from a routine testing organization to a testing, inspection and research department has resulted in a crystallization of its functions and a clearer understanding of its place in the organization of the Commission.

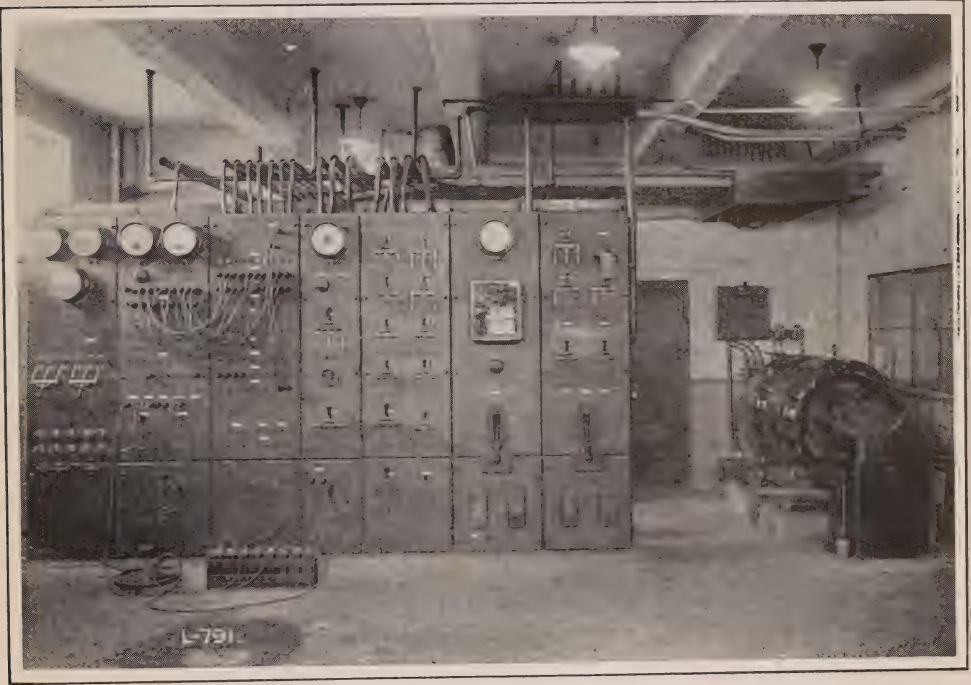


Laboratory Switchboard Room showing four-unit Motor Generator Set, used for 25-Cycle, direct current tests.

The functions of the Laboratories are testing (including inspection), research, and engineering activities of a miscellaneous character. The testing work includes routine testing, special testing and approval testing. Under routine testing may be classed:

- (a) Acceptance tests, made on apparatus or samples of any product purchased under specification, from the results of which tests the product is accepted or rejected.
- (b) Inspection of engineering materials such as steel, concrete, etc.
- (c) Control tests for the purpose of obtaining a continuous record of the quality of a product being regularly used. These include such products as transformer oil, rubber gloves, etc.
- (d) Standardization and calibration of electrical measuring instruments.

Special tests include those for which no standardized method of procedure has been developed. These ultimately become routine tests as accumulated experience in testing any product results in standard methods of conducting the same. Among such may be mentioned tests on lubricating oil, paint, gasoline, insulating varnishes and tapes. Many special tests are also made at the instance of other departments to enable them to fix practice in field construction. For example tests were recently made of the dielectric strength of various thicknesses of insulating tapes when applied to high tension conductors, to enable the engineering department to draft rules governing the insulation of conductors in exposed positions in stations. Special tests are also made on defective apparatus sent in by municipalities.



Laboratory Switchboard Room, showing main switchboard and 60-Cycle, Motor-Generator Set.

The approval testing is described in detail below.

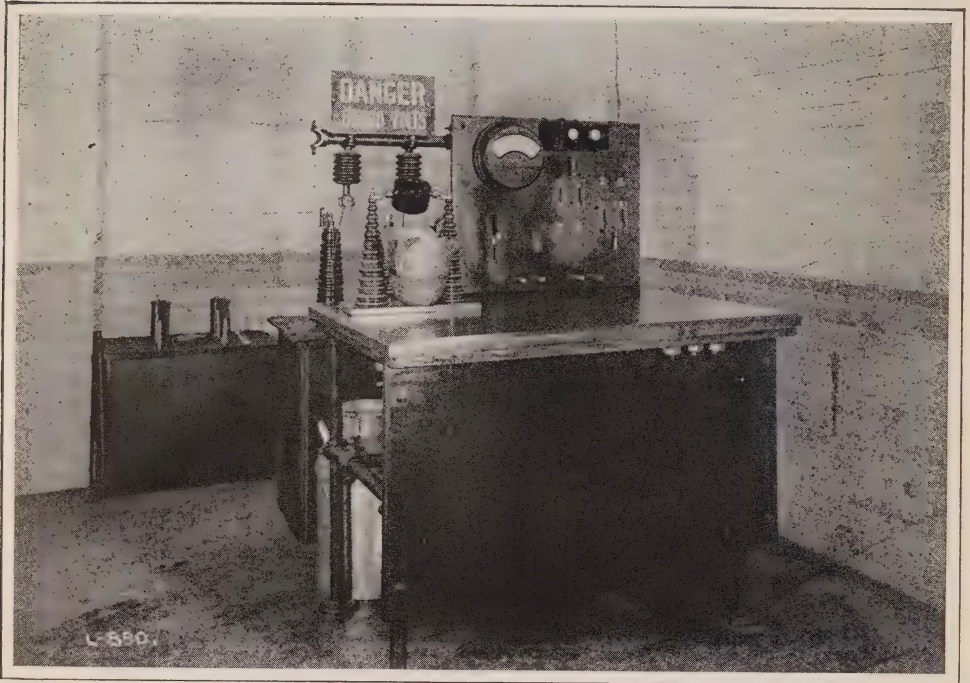
Fully fifty per cent. of the work of the Laboratories may be designated as research. This work originates either in the Laboratories as the result of suggestions by individual members of the staff, or in other departments as a result of their needs. The investigations undertaken range from comparatively short studies to extended researches occupying the time of several men. Particular subjects now under investigation are referred to more fully below.

Additions to the equipment have been made as they became necessary and plans are now under consideration for additions to the building to provide adequate accommodation for those sections which are now handicapped for lack of space.

High-Tension and Electrical Testing Laboratory

Previous reports have outlined the general activities of this Laboratory and have listed various items of equipment which are essential to its work, hence it is not necessary to enumerate the various items in detail nor to recount the routine tests which have become standard practice.

In a general way we may say that this Laboratory is prepared to undertake practical electrical tests, studies or investigations of almost any range. Tests which have become standard practice are systematized and treated as routine for economy of operation as well as proper comparison of results. Frequently, however, special



Fifty Thousand volt test bench, arranged for automatic operation. Used for testing Rubber Gloves, Transformer Oil and other Insulating Materials. Oil Test Cup shown in place.

—Electrical Laboratory.

tests are required to clear up some doubtful phenomena and the final results are usually of sufficient importance to be dignified by the name of an investigation.

Routine electrical tests are made on many classes of apparatus and materials. The various commercial tests are made on constant potential and constant current transformers, alternating and direct-current generators and motors along the lines mentioned in previous reports with the added advantage of equipment especially suited for this class of work. The testing of oil for dielectric strength is a routine test important not only because all the high-tension transformers and oil-breakers are thus looked after, but approximately fifty samples per month are received from various municipal stations. High-tension insulator investigation is also an important routine test, though its development and the various methods of line construction warrants its mention as a special line of investigation also. Apparatus

is available from which any single phase voltage up to 200,000 volts at 25 cycles or 400,000 volts at 60 cycles may be obtained and a great deal of work is done at 110,000 volts and higher.

The monthly testing and inspection of linemen's rubber gloves has become standard practice as outlined by the Committee on Accident Prevention. These tests are made to ensure the safety of linemen and others when it is found necessary to work on live apparatus and a record is kept of the life history of each glove used for this purpose.

Among the various classes of work done in a regular way are, the measurement of load distributions in mills and factories, checking the suitability of application of special electrical apparatus to various uses; testing for manufacturers with a view to improvement in certain lines of manufacturing are also undertaken with satisfactory results.

Progress has been made during the year on several investigations of considerable importance to the operation of the system, among which are the following:

The measurement of dielectric losses in power transmission cables at high voltage and throughout the range of temperature of normal operation by various methods. Closely related to the practical results of this problem is the question of the thermal conductivity of insulation. This is also being studied.

The advantages and disadvantages of various methods of electric welding.

Relative merits electrically of different types of line construction 12,000 to 44,000 volts.

The characteristics of new types of rectifiers. Four kenotrons have been added to our equipment ranging from 1,000-volt to 100,000-volt rating.

The development of high capacity quick-acting fuses.

The effect of various modifications in present apparatus for protection against lightning.

Studies on a new type of current transformer for use on high voltage lines with the particular purpose of relay protection in view.

The effects of various methods of transformer grouping, the results applying to high and low capacities.

Analysis of the conditions to be met by high-tension line insulators and corresponding tests on the same.

Compilation of data on various thicknesses of insulation made by tape wrappings.

Factors affecting the interference of power lines with communication lines due to electrostatic and electromagnetic induction.

The close co-operation between the various sections of the laboratories greatly facilitates the solution of such problems as have been mentioned.

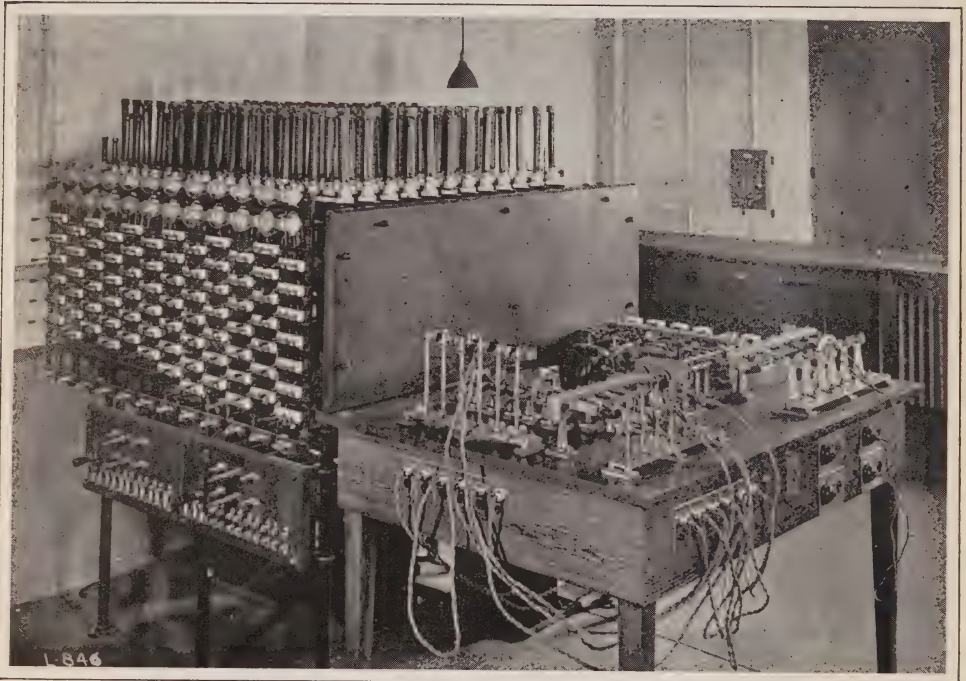
This laboratory also makes acceptance tests on electrical machinery for the engineering department. The most important of these was a complete test on a 3,750 kv-a., 6,600-volt, 60-cycle generator, made after installation. The test included heat runs at 80 per cent. and 65 per cent. power factor, overspeed and short-circuit performance.

Approval Laboratory

The past year has seen considerable progress in the methods of test and handling applications for approval of electrical material, devices and fittings such as are used in inside electrical installations and therefore, come under the Rules and Regulations of the Commission for such work. More than one hundred approval cards have been issued the result of a corresponding number of approval

reports completed during this period. This does not include a much larger number of preliminary letter reports to the submitters of devices which have for various reasons been criticized for the purpose of bringing these devices up to the standard requirements.

There has been some change made in the method of procedure for approval of electrical material, etc., and also in that for the follow-up service. These changes are now embodied in what is known as "The Rules and Specifications for test and approval of Electrical Material Devices and Fittings" which were approved of by the Commission in March, 1919, and have since been issued in the form of a printed looseleaf book. Thirteen specifications are attached to this first edition, all having been adopted almost in their entirety from the Code for Electrical



Endurance Testing Machine for approval tests of key sockets and snap switches.

—Approval Laboratory.

Appliances issued by the Underwriters' Laboratories. These specifications do not cover a large proportion of the work passing through this laboratory and it has therefore, been necessary to supplement them by others of a tentative nature as will be noted below. The data for the preparation of some of these tentative specifications has already been collected by the laboratory engineers.

In order that the findings of the Approval Laboratory might be checked and supplemented by the experience of others it was deemed advisable by the Chief Engineer to appoint a Committee on Approval of Electrical Material, etc., which would act purely in an advisory capacity with the laboratory engineers in making recommendations to the Commission. The personnel of the Committee includes representatives from various electrical associations, engineering bodies, and trade organizations, from the Canadian Fire Underwriters' Association, and the engineer-

ing and inspection departments of the Hydro-Electric Power Commission. Each member of the Committee receives by mail a copy of every approval report and has the opportunity of submitting any criticism on same to the Secretary of the Committee before the report is forwarded to the Commission for approval. Meetings of the Committee are called as occasion demands for the purpose of discussing matters affecting the operation of the rules and specifications. In this connection the matter of tentative specifications for material, etc., not covered by the published specifications was referred to a sub-committee of Laboratory representatives so that such specifications might be prepared in conference with representatives of the manufacturers concerned and then submitted to the whole committee for discussion. Several of these tentative specifications are now in course of preparation including among others, electric washing machines, electric ranges, cooking appliances and air heaters, and bell-ringing transformers.

Provision has been made in the Rules and Specifications for the listing by the Commission of any electrical material, etc., which had been approved by other recognized authorities upon satisfactory evidence of same being submitted. It is the intention in this regard to cover ultimately in the approval record all material being offered for sale as well as manufactured in Ontario. These records will be distributed to inspection authorities outside the province and to others interested, at a nominal charge.

Equipment which was under construction at the beginning of the year has since been completed. It was necessary to take over an additional room in which to install the fuse-testing boards; but even with the additional floor space the working quarters for approval testing are very cramped. No space is available as yet for any equipment for electrical tests of insulated wire and cable. The photograph accompanying shows the endurance testing machine for applying operating tests at rated load to such devices as key sockets and snap switches.

This department has been able to furnish assistance in the determination of the characteristics of the two 4,000 kv-a. condensers now operating at Toronto Station, and many measurements have been made on these machines, both with indicating instruments and the oscillograph. Assistance has also been rendered in connection with a series of tests of a "wired-wireless" telephone system which was being considered for plant operation. A very interesting test was made with the oscillograph on a synchronous booster set in a customer's plant with a view to determining the effect of the booster on the wave forms of potentials and currents in rotary converters. The oscillograph has also been very useful in determining the characteristics of rectifying devices, special transformers, and various electro-medical and other devices submitted to the Approval Laboratory.

Meter and Standards Laboratory

The work of the Meter Laboratory during the year has been largely of a constructive nature. Opportunity has been taken to put into a permanent shape much of the equipment which it has heretofore been necessary to consider as a more or less temporary installation. Reference was made in last year's report to the permanent table for the secondary standards. This has now been completed, as have also similar tables for the potentiometer and the resistance bridges. These structures, consisting of massive pipe frameworks, fitted with marble tops and switchboards, are fully equipped with the necessary switches, indicating meters, rheostats and galvanometers, so that any desired current can be quickly obtained and measured with high precision, whenever desired. These tables are also arranged for interconnection so that an instrument which is being checked on

one table can be compared with a standard on another table without the necessity of changing the position of either, or of stringing temporary circuits. Terminals of a ten-wire interconnecting cable, which reaches practically all sections of the Laboratories, are also brought to the standard table, so that a current or voltage in some other section may be quickly transferred to the standard instrument and there measured with a degree of accuracy greater than is possible with portable meters.

By means of the Wheatstone bridge and the Kelvin double bridge, both permanently set up on their own table, it is possible to quickly and accurately determine resistance values, whether they be high or low. Construction has been completed on a test ring outfit for determining the characteristics of current transformers.

As the small portable table referred to in a previous Annual Report, arranged for use with the oscillograph, has frequently been found too cramped for the immense variety of oscillographic work done in the laboratory, there has been developed and constructed a much larger table, mounted on rubber tired wheels, and equipped with all the switches, resistors and shunts necessary for the efficient operation of this instrument. The outfit, completely set up, can thus be moved with ease to whatever part of the laboratory may be convenient; without the disturbance of any adjustments. The original table is now kept packed up ready for shipment, so that the whole oscillographic outfit may be quickly sent out to any part of the system where special tests may be desired.

The supply of portable metering equipment in the custody of this department has been greatly augmented during the year. A large number of voltmeters, ammeters, wattmeters, and instrument transformers have been purchased and placed at the service of the laboratory. The Meter Laboratory is held responsible for the condition of this apparatus, and has, therefore, drawn up a set of rules covering the use of portable metering equipment, with due regard to all possible causes of damage and sources of error. These meters are periodically checked and every care is taken to keep them in good repair and accurate calibration.

The Instrument Shop has been in successful operation for over a year with most satisfactory results. The convenience of having a shop, well equipped with precision machinery, apparatus and tools for working on delicate electrical and mechanical equipment, has been appreciated by all sections of the laboratories. It has been found possible to keep the laboratory apparatus in better repair than formerly; and in some cases pieces of equipment upon which the manufacturers did not perform a satisfactory job, have been almost completely redesigned and rebuilt. A considerable number of special instruments required by the various sections of the laboratories have been constructed in the Instrument Shop.

The testing, repair and inspection of watt-hour meters, demand meters and other commercial instruments have proceeded steadily and a great deal of work of this class has been done for the Commission's customers; particularly the small municipalities who cannot afford to maintain their own meter departments. Considerable work of this class has also been done for outside parties who are not regular customers of the Commission.

Among other instrument work which has been done for municipalities and departments outside the Laboratory, or other parties, may be mentioned the following:

Graphic meter repairs, megger repairs, readjustment of rail bond tester, calibration of wattmeters, voltmeters and ammeters, investigation of new types of watthour meters, and special tests on various types of measuring devices.

Considerable investigation and research work has been done by this Laboratory, both independently and in conjunction with other departments. The results obtained from previous tests on demand indicators lead to the belief that the only conclusive evidence which can be obtained in regard to the operation of these important instruments, is that which comes from actual tests in service. With a view to determining some of these characteristics and reconciling the divergent opinions now held in regard to the use of demand meters, a complete comparative test is now under way, in which a number of meters of different types and time periods are being compared in actual service on various classes of industrial loads. It is expected that the results of these tests will shed much light on the true status of the demand meter.

Photometric Laboratory

There has been nothing radically new to report during the past year. The volume of lamp testing has been greatly in excess of that of any previous year, necessitating an increase in the staff. The regular inspectional tests of lamps received for stock have been carried on as usual. These tests include examination for mechanical and physical defects, tests of strength of basing cement, measurements of candle power or lumens and watts consumption, and tests of life performance. The number of lamp tests for parties outside the Commission forms a very considerable proportion of the total number of tests. The torsionometer made for testing the strength of the basing cement has proved itself particularly valuable during the past year. By its use lamps whose bases were not secure were detected in the laboratory thus preventing inconvenience to lamp purchasers which would have occurred if they had been shipped out.

A detailed study has been made of the cost of operation of lamps of various efficiencies, to determine the efficiency that will cause the most economical lamp operation on the Hydro system. The results of this study are being prepared for discussion by the lamp committee of the Commission and will furnish definite data on which to revise our lamp specifications.

A test of signal lamps for use on remote control switchboards is being conducted. The carbon lamps in general use are of low efficiency causing a heavy continuous load on the storage battery as well as excessive heating of the surrounding parts of the switchboard. A special type of 15-watt tungsten lamp on test will, from present indications, prove far superior in all respects to the carbon lamps.

A shock-testing machine is being constructed in the laboratory for measuring the ability of lamps to withstand vibration. Lamps will be subjected to drops increasing by .1-inch steps (or less if advisable) up to a total drop of 5 inches.

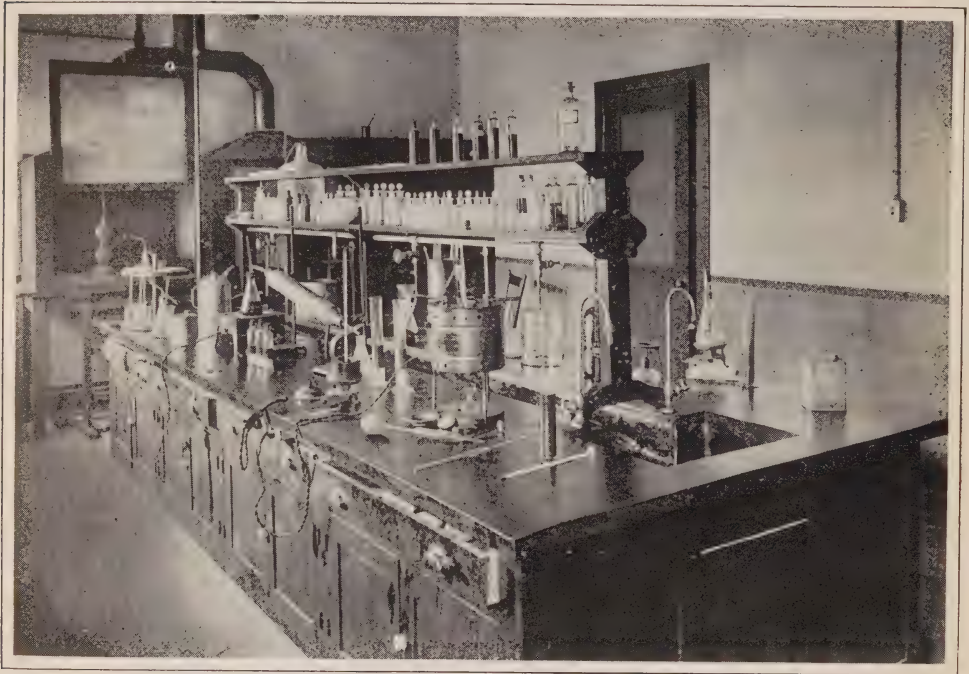
An improvement has been made in the facilities for measuring circuit voltages on the life testing racks. Potential leads from each circuit are brought to the front of the control board so that the voltage of any circuit may be measured from this location.

A compound lamp rotator for standardizing lamps for use in the sphere photometer has been added to the equipment.

Illumination tests during the year have been limited to a few tests of industrial lighting fixtures and illumination surveys of offices. The services of this Laboratory are being used for planning illumination installations for various departments

of the Commission. An example of this is the flood lighting of the Horseshoe Falls at Niagara, which was put into operation by H.R.H. the Prince of Wales on October 18th. This installation was preceded by a test of a group of projectors sufficient to light a 10° zone across from the Ontario Power Company generating station. This served as a check on previous calculations. A spray test was also made on competitive projectors on the roof of the Laboratory Building to determine the effect of the ventilation provisions on the entrance of spray into the projectors.

This Laboratory is prepared, at any time, to make tests of lighting installations of any class and to test any kind of material entering into illumination problems.



Main Work Bench. An oil test in progress.—*Chemical Laboratory.*

Photographic Laboratory

The work of this section of the laboratories has increased in volume during the past year. Over 600 orders were received for developing and printing of exposures made in the field by the Engineering Staff.

The construction work at Niagara Falls necessitated monthly trips by the photographer, in order to obtain a satisfactory progress record of the Niagara Power Development and the Ontario Power Company Extension. Over 1,100 pictures have been taken since the first of the year. These have been indexed and filed. Official photographs were also taken of the extension of the generating station at Big Chute on the Severn River.

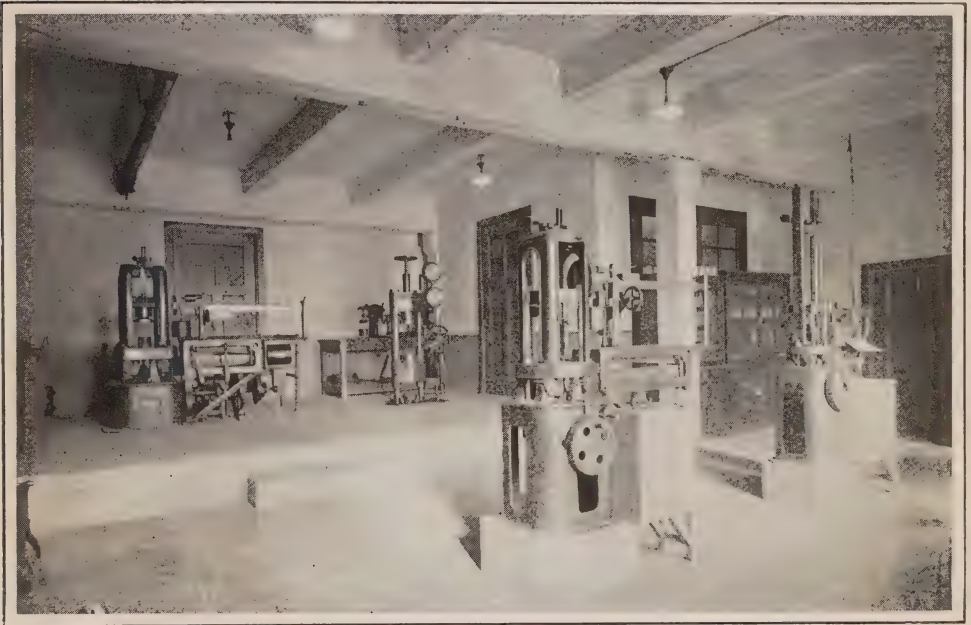
In view of the great increase in the amount of blue printing required by all departments a blue printing machine has been installed in the Laboratories and this Laboratory is now taking care of the blue printing for all departments of the Commission.

Chemical Laboratory

The Chemical Laboratory now occupies the new quarters assigned to it. An assistant chemist has been added to the staff to handle the increasing volume of work required of this department.

It is hard to classify the work of this Laboratory, much of it is of a semi-routine nature even where the work is in connection with research. One hundred oils and greases, twenty paints, twenty-five varnishes and several hundred analyses of all classes of materials such as rubber, coke, steel and other metals, cement clays, rock, etc., were made during the year. For the convenience of the Stores Department the Laboratory has been frosting, as needed, small lots of lamps. Approximately 3,000 lamps of all sizes have thus been treated in the last twelve months.

Some interesting investigations have been undertaken and completed. Methods



Testing Machine Room—*Structural Materials Laboratory.*

of reclaiming used lubricating oils have been studied and the results have been very encouraging. An important series of tests has been made upon paints to find one capable of withstanding the very severe service conditions encountered at several points on our system. As a result a number of promising paints have been found which are now being given a try out under service conditions.

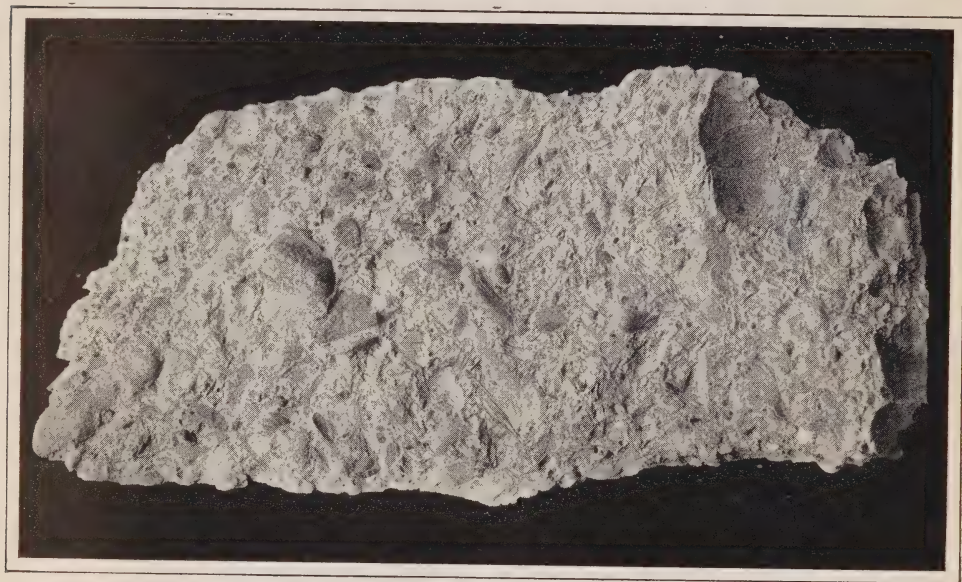
Structural Materials Laboratory

The character of the work, handled by this Laboratory has undergone little change during the past year and will not be again described. The volume of work has almost doubled, necessitating both increased staff and additional equipment.

Several of these additions to the equipment are of sufficient importance to warrant special mention. A 100,000-pound capacity motor-driven and a 20,000-pound capacity hand-driven Olsen screw testing machine have been installed.

These machines are capable of handling all tension, compression and bending tests up to their capacity. In addition to these a 500-pound capacity hand-driven and a 50-pound capacity motor-driven tension machine have been added for the mechanical testing of tape, rubber, small wire, etc. Besides these testing machines a Brinell meter for determining hardness of metals, a compressometer for obtaining the modulus of elasticity of concrete, and a photomicrographic outfit for microscopical study of both metals and concrete are worthy of mention. The last two were constructed in our Instrument Shop.

The investigation upon the surface area theories of proportioning concrete mixtures has been carried on continuously throughout the year and to date has involved some 4,000 tests. Important results are being obtained. As a result of this work a method of proportioning concrete mixtures which will give concrete of any desired quality and allows mixtures of various consistencies to be used as desired, has been developed. This method has been used during the past summer



Sample of Frozen Concrete received from field work, showing frost marks caused by freezing before concrete had set.

—*Structural Materials Laboratory.*

on the High Falls Development and this fall on parts of the Niagara Power Development and has given very satisfactory results. Its use is to be extended to other jobs during the coming year.

Before applying the new method to any particular job it is necessary to determine the quality and concrete making properties of the materials to be used. A series of such tests have been carried out for the High Falls, Niagara Power and Nipigon Developments.

An interesting and important development arising out of this investigational work on concrete materials has been the relation discovered, that the change in volume of a fine aggregate with change in its moisture content depends on the surface area of the materials. Based on this, a method of obtaining the surface area of a material has been devised which does not require a screen analysis of the material, yet yields results of considerable accuracy.

An investigation is now under way to determine the effect of silt or dust in concrete mixtures and their proper treatment under the "Surface Area" method of proportioning. Natural cement is being studied in a small way. The laboratory is also co-operating with the American Society for Testing Materials on some of their committee work.

Studies of some magnitude have been carried out during the year on babbitt metals, on the use of nickel steel for penstocks, on mechanical devices for anchoring bolts in concrete and on fire extinguishers.

The inspection service maintained as a branch of this department has looked after the shop and field inspection of the penstocks and other steel work for the Ontario Power Company of Niagara Falls, mentioned in last year's report, and about 1,200 tons of miscellaneous steel products, rails, reinforcing steel, fence steel, etc. At the present time the department is carrying out shop inspection of the steel work for the power house of the Nipigon Development.

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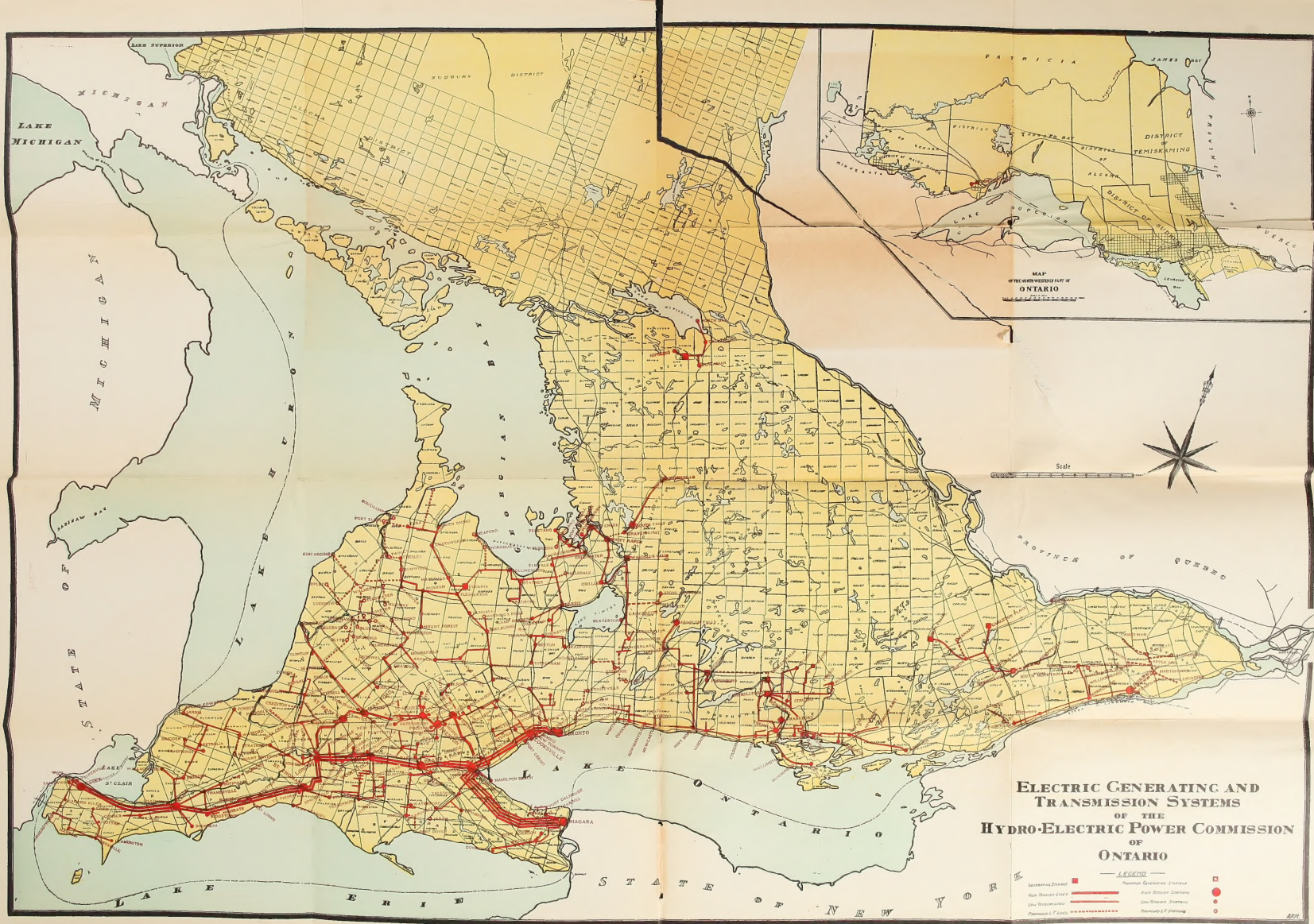
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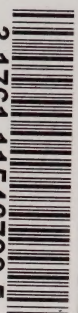
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